

WITH SHORT-WAVE SUPPLEMENT

BEST "3" YET  
The "1932  
ETHER  
SEARCHER"  
CONSTRUCTORS GUIDE

# Amateur Wireless

and  
Radiovision

Every  
Thursday  
3<sup>d</sup>

Vol. XX. No. 502

Saturday, January 23, 1932

BUILDING  
the "1932  
ETHER  
SEARCHER"

The A.W. PRACTICAL  
SHORT-WAVE GUIDE



MANY LOUD-SPEAKER HINTS & TIPS



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- 2 5,000 - - - price, each 1/-
- 1 1,000 - - - price 9d.

are specified for the "1932 Ether Searcher" described in this issue.

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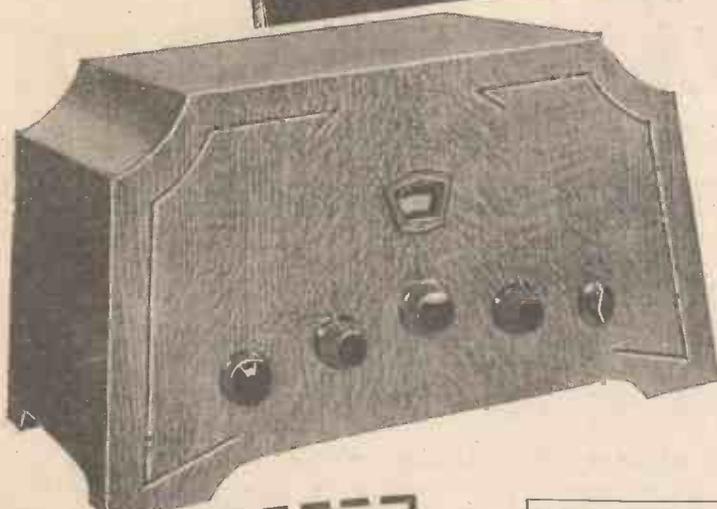
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Piece of aluminium foil, 15½ in. by 9½ in.	1 0
Junit, one five-pin valve holder...	10
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Telsen, one four-pin valve holder	6
Lissen, two .0002-mfd. fixed condensers	2 0
Dubilier, type 620, one .0002-mfd. fixed condenser	1 8
Dubilier, type 9200, three 1-mfd. fixed condensers	8 3
Dubilier, type 9200, 2-mfd. fixed condenser	3 6
Dubilier, type 9200, .05-mfd. fixed condenser, non-inductive	2 0
Lissen high-frequency choke (Disc Type)	2 0
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Formo "Midget" .0002-mfd. reaction-type variable condenser with knob	3 3
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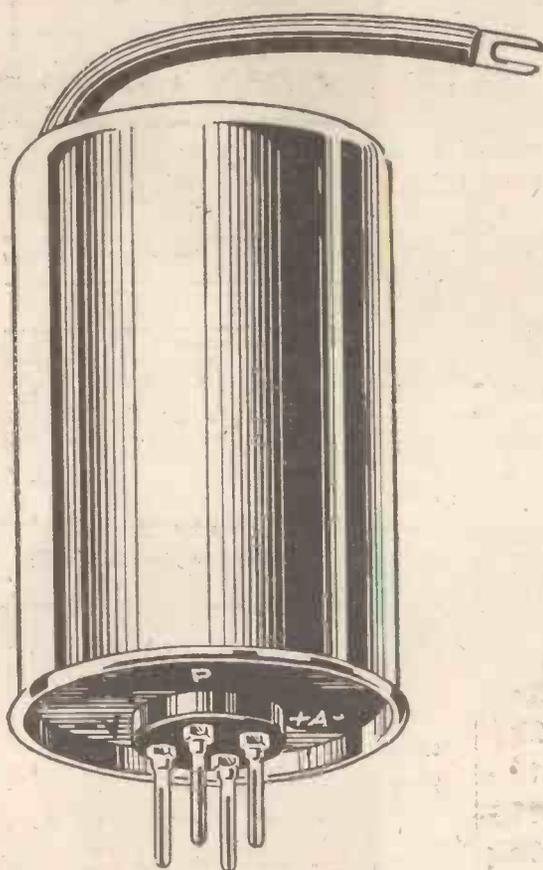
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## FIVE-VALVE SHORT-WAVE SUPER-HET



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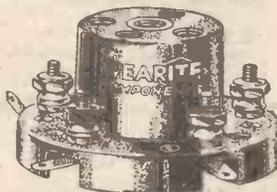
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British Radio Engineer's new invention "puts the SHORT WAVES on your EXISTING SET"

SOMETHING really new, simple and absolutely practical. It opens up a new world of Radio, even more fascinating than ordinary broadcast reception. Thanks to the inventive genius of Mr. G. T. Kelsey, the famous short-wave expert, you can listen to the short-wave stations all over the world. No need now for the expense and trouble of a special all-wave set to pick up America, Africa, Australia or India. Just plug the PILOT SHORT-WAVE ADAPTOR into your present battery Set. This remarkable Unit fits without any alteration. No extra valve required, no additional apparatus. Ready for immediate use and sold complete with Dial Calibration Chart and simple tuning notes; "How to Hear the Short-wave Stations," specially compiled by an expert. Your dealer should have it in stock.

"I purchased a Pilot Short-wave Adaptor, and feel I must tell you how pleased I am with its performance. In addition to Rome, Zeesen, Moscow and Chelmsford, I can, unless conditions are very bad, at any time get Schenectady and KDKA and Pittsburg, and have also picked up other Americans. Sunday last I picked up at 3 o'clock in the afternoon, a transmission from VK2ME Sydney; this at the first attempt." (Sgd.) W.W.A. Wolverton Bucks.

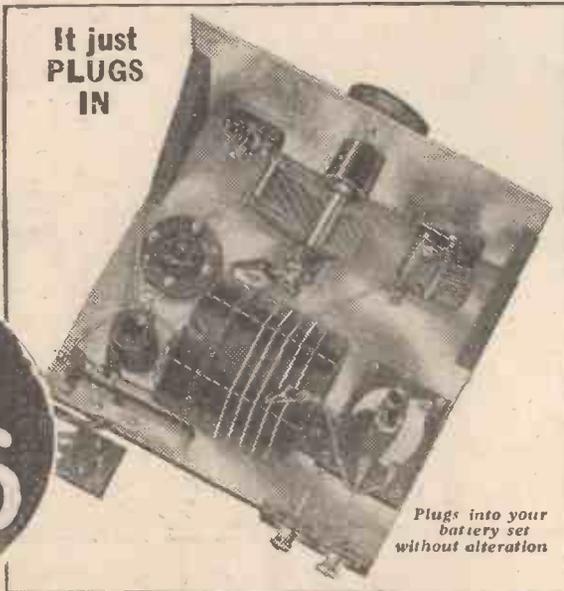
"It is really wonderful. The following were all obtained on the loud-speaker. Chicago, Bound Brook, Pittsburg East, Cassablanca N. Africa, Lisbon, Rabat, Radio Maroc, Schenectady, Zeesen Germany, Eindhoven, Chelmsford, Rome, Vatican City and Moscow. These were obtained on three valves." (Sgd.) M.D.G. Hadleigh, Essex.

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Plugs into your battery set without alteration

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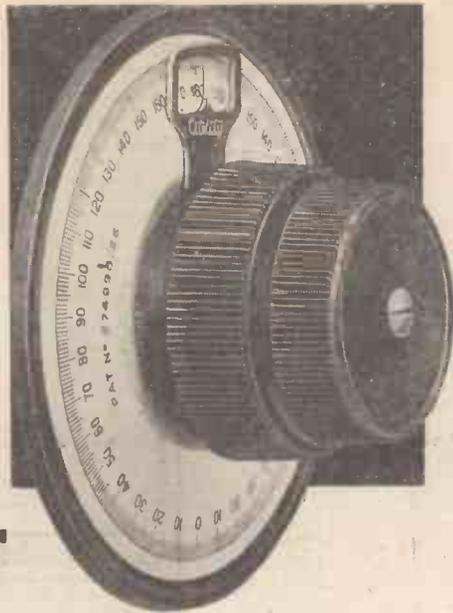
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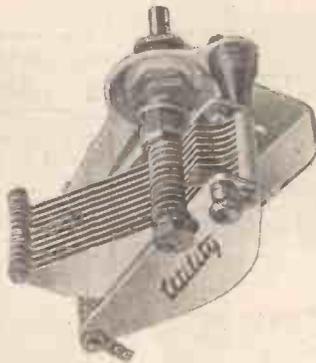
# FOR THE A.W. S.W. SET



Dead accurate and hair line tuning is imperative for successful results from a S.W. set. That is why the designers of the AMATEUR WIRELESS one - valve short - waver specified Utility Dial and Utility Condenser.

W181 is a true micro dial. The ratio is 100-1—the drive is frictional and guaranteed free from backlash. The open scale is surveyed by line and cursor, and as the line is a real hair line without appreciable thickness, very accurate readings can be taken even of the sub-divisions.

W187, our short-wave condenser, is equally good. Designed by S.W. experts for the use of S.W. experts, it is the ideal condenser for workers in this field. It is built with the precision of laboratory apparatus, yet is sold at a price that competes with the ordinary type of condenser.



W181 S.M. Dial - - 7/6  
 W187 S.W. Condenser, 6/6  
 The two together, 13/-

From all good dealers or post free from the makers of the world's finest condensers.

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THERE'S now no need to scrap your battery-driven receiver in favour of a new and expensive all-mains model. You can enjoy absolute reliability, increased power and economy, and put an end to battery troubles for ever by converting your old set to mains operation.

Get an "ATLAS" All-British Mains Unit. Nothing could be easier to install, nothing simpler or more reliable in operation and it will cut your running cost to only one penny a week. Ask your dealer to demonstrate, and be sure to insist on "ATLAS," the winners of the *Wireless World* Olympia Ballot in 1930 and 1931.

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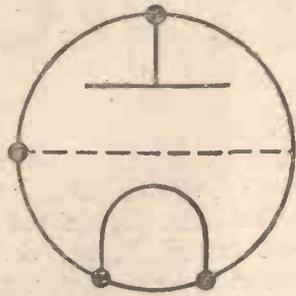
Please send me FREE copy of "Power from the Mains," telling me how to convert my battery set to mains operation.

Name.....  
 (in capitals)  
 Address.....



29/1

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Mazda valves are the necessary complement of a good circuit. They are now standardised by all the leading set makers; radio engineers are unanimously agreed on their excellence. Mazda valves are 100% British made and designed by British engineers.

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**1 VALVE SHORT WAVE**

HL.210 8/6

**SHORT WAVE SUPER-HET.  
ADAPTOR**

HL.210 8/6

● The amazing

**MAZDA**  
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**EDISWAN RADIO**

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# GOLLY! THAT'S ALGIERS

Tour the Continent or take a Mediterranean Cruise from your fireside. The Telsen 3 brings in a score of foreign radio programmes clear, distinct and at full volume. During the week you may ask chiefly for the National and Regional programmes—and in they come, absence of overlapping guaranteed, no distortion, and as powerful as you wish. But on Sundays you certainly want to go farther afield—and over you go—to Paris, Vienna, Berlin, Rome, even to Warsaw and to Algiers . . .

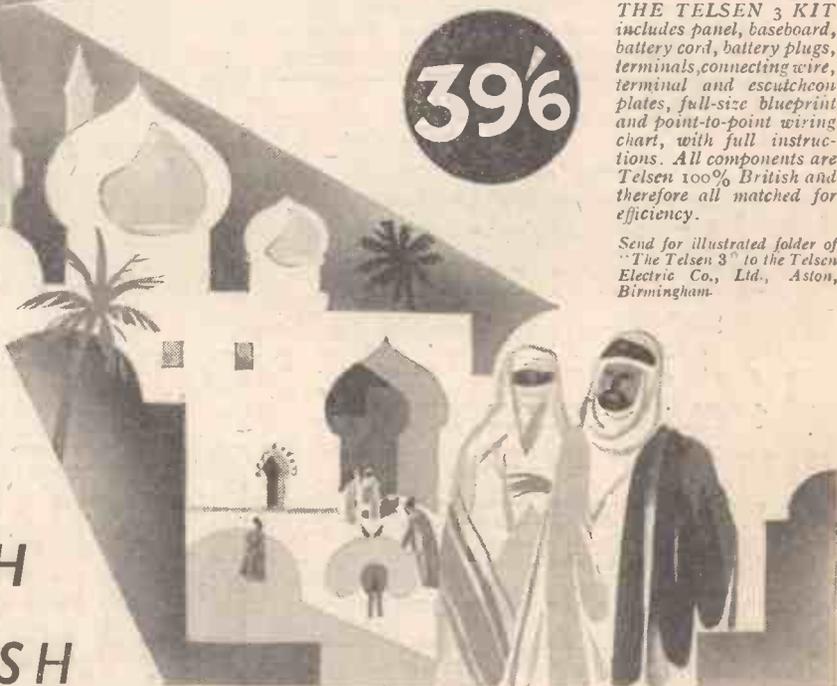
You need no expert skill to build the Telsen 3. An evening delightfully occupied and you are ready to tune in not only to British but to Foreign radio programmes—with success guaranteed. The only tools required—a pair of pliers and a screwdriver! Buy your Telsen 3 Kit to-day and to-morrow evening tune in for the first time on a perfect receiver made by yourself—and, remember, the cost of the Kit is as little as 39/6!

**39/6**

*THE TELSEN 3 KIT includes panel, baseboard, battery cord, battery plugs, terminals, connecting wire, terminal and escutcheon plates, full-size blueprint and point-to-point wiring chart, with full instructions. All components are Telsen 100% British and therefore all matched for efficiency.*

*Send for illustrated folder of "The Telsen 3" to the Telsen Electric Co., Ltd., Aston, Birmingham.*

TOUR THE  
CONTINENT  
FROM YOUR  
FIRESIDE THIS  
WINTER WITH  
AN ALL-BRITISH



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*Ldnt. of The Telsen Electric Co., Ltd., Aston, Birmingham.*

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# Amateur Wireless & RADIOVISION

BRITAIN'S LEADING RADIO WEEKLY  
FOR CONSTRUCTOR, LISTENER & EXPERIMENTER

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RESEARCH CONSULTANT:  
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ASSISTANT EDITOR:  
H. CORBISHLEY

## NEWS & GOSSIP OF THE WEEK

### OUR "SPECIAL"

THIS is the second Special Number announced last week and, as promised, you will find it full of good things. The twelve-page supplement on short-wave reception will interest all listeners, even those who have not yet tried the "wavelets." "1932 Ether Searcher" builders must see the pictorial guide and construc-

tional details in connection with this fine new set, while all listeners will profit by the "Score of Speaker Hints and Tips," which make a special feature in this issue.

### HONoured BY CAROL

M. BRAILLAID, the well-known President of the Technical Committee of the U.I.R., the body responsible for checking up our wavelength plans, has been making a European tour to see how the Prague plan is working in various countries such as Roumania. King Carol granted him an audience and, after talking at length about technical radio matters (Carol is a keen listener), made him a Commander of the Order of the Crown of Roumania.

### CHRISTOPHER STONE'S PROGRAMME

AS Christopher Stone is generally known in connection with gramophone broadcasts, it is a pleasant surprise to find that he is responsible, with Gordon McConnell, for a January 26 programme called "New Songs for Old." Details of this are not available yet, but we think the B.B.C. is wise in taking advantage of Stone's knowledge of what the public wants in the way of music, judging from the popularity of his record broadcasts. This item will be heard on the National.

### NEW TALKS DIRECTOR

AS we ventured to forecast some time ago,

Mr. Charles Siepmann has been made Talks Director of the B.B.C. Lionel Fielden will have control of the topical talks and Tony Rendall will be responsible for the talks dealing with adult education. We understand that in future the news section will come within the Talks Department, so Mr. Siepmann will have his hands full.

### THOSE SUNDAY PROGRAMMES

ALL readers must be aware of the intensive campaign now going on for brighter B.B.C. programmes on Sunday. We ourselves have tried hard to convince the B.B.C. that Sunday is not necessarily a day of penance. The B.B.C. emphatically denies any change in the present policy, but we understand that an extension of hours is being considered. Within the next few months we shall very likely have Sunday programmes through B.B.C. stations from 1 p.m. onwards. The only trouble is that these earlier programmes may swamp the dials on sets tuned to sponsored programmes from abroad.

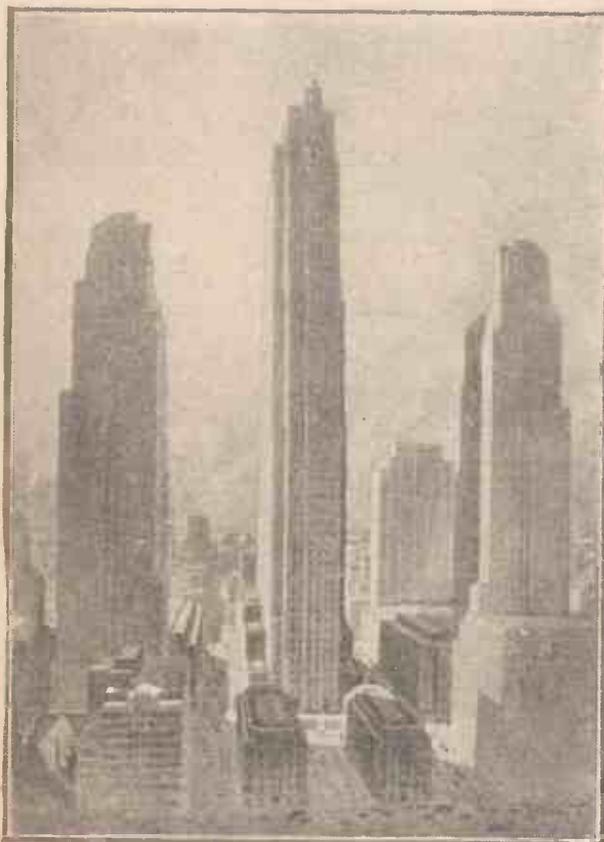
### A TYPICAL REPLY

A READER passes on to us, without comment, an extract from a reply received from the B.B.C. in response to a letter he had sent to Savoy Hill about the Sunday programmes. "You need have no fear," said the B.B.C., "that there is any intention at all to lower the standard that we have set up in this matter. We are satisfied that our policy and practice are approved by the great majority of listeners."

### EMPIRE BROADCASTING

CONTRACTS will shortly be placed with Standard Telephones & Cables, Ltd. for the erection of the two short-wave stations at Daventry, which, readers will recall, are to provide the Empire with programmes throughout the twenty-four hours of the day. The B.B.C. hopes to have these transmitters in operation before the year is out. The aerial power of each will be 20 kilowatts.

### A PEEP INTO THE FUTURE



A forecast of New York's Radio City. This is a photograph of the architect's wash drawing of the block of buildings between Fifth and Sixth Avenues in New York, which will cost about £100,000,000 and will embrace practically the whole of New York's broadcasting

**NEXT WEEK: A TWO-VALVER YOU CAN BUILD FOR 25/-**

# NEWS & GOSSIP OF THE WEEK —Continued

## RE-MAKING 5XX

THE next big constructional job on hand for B.B.C. engineers is the rebuilding of an up-to-date plant for Daventry 5XX, to serve the whole of Great Britain on long waves. This work will be undertaken within the next few months. At the moment the B.B.C. is looking for another site for 5GB, the Midland Regional transmitter, as its present

## THE B.B.C. CONTROLLER



Vice-Admiral C. D. Carpendale, C.B., Controller of the B.B.C. since 1923, has been re-elected President of the U.I.R. for the fifth consecutive year. The Union Internationale controls European wavelength schemes, so British listeners are well represented!

position at Daventry is not ideal for Midland Regional reception.

## ABOUT JACK PAYNE

SO Jack Payne is leaving, after all the rumours and counter-rumours! He leaves the B.B.C. officially on March 12. On the day Hilda Matheson leaves—namely, February 1—in comes Jack Payne's successor, Henry Hall, to start his rehearsals in the studios at Savoy Hill. He says

"I am going to play 'sweet music,' not 'hot' jazz."

## DRAMATIC MOMENTS

THE day Henry Hall called to see the B.B.C. he did not know when he entered the building that before he left he would have signed the contract to make himself director of the B.B.C.'s dance music. He is a charming man, of quiet and unassuming character, and should prove a worthy successor to Jack Payne.

## WE WONDER!

JACK PAYNE has, of course, gone to very big money in making gramophone records and fulfilling music-hall engagements. Henry Hall comes, no doubt, into great possibilities. But at the moment, both dance band leaders must be wondering whether they have done the right thing in making a change. January 8, 1932, was a day of big decisions for both of them. We wish them good luck!

## B.B.C. AND THE GRAMOPHONE

BY all accounts, the antagonism that sprang up between the B.B.C. and the gramophone companies threatens to break out again. The slump in record sales is attributed in part to the counter-attraction of broadcasting. The gramophone companies are in a very strong position and might show their strength by forbidding artistes with gramophone contracts to broadcast.

## ENGLISH FROM ALGIERS

ALGIERS is a fairly good test of reception just now, and ether hunts for it will be whetted by the arrangement of special English broadcasts at 9.45 every Tuesday evening. These English talks were to have started at the beginning of last month, but owing to programme hitches they are only now just starting.

## A TRAVELLING SHORT-WAVER

READERS who profit by the advice given in the short-wave supplement

of this issue, and who soon find that bringing in the ultra-short-wave American and Australian stations is often easy, should make a note in their reception logs of a new travelling Australian station. This is fitted up in two vans, one carrying the transmitter and the other the studio and a library of 400 gramophone records. This newcomer to the ether is touring the sheep farming areas.

## B.B.C. ORCHESTRA

MANY listeners have asked why the B.B.C.'s Symphony Orchestra has never been recorded. The reason is that

## FOR BUILDERS OF OUR NEW SET!

Constructors of the "1932 Ether Searcher" who are now making up their new set with the aid of the full-size wiring diagram given in last week's issue should take advantage of the pictorial diagram on pages 152 and 157 of this issue. This has been specially prepared by the "A.W." Technical Staff to illustrate the leading features of the set, and will be of the greatest assistance to present set-builders. A constructional description is given on pages 154 to 156.

Next week's issue will give full operating instructions, enabling you to get the best from your outfit, so order your copy now.

the B.B.C.'s contract has been with Columbia, but certain artistes have been tied to H.M.V. Now arrangements have been made for the whole orchestra to record for H.M.V.

## GRETA KELLER BANNED

THE girl with the fascinating microphone voice, Greta Keller, who was recently heard by listeners to Radio Paris during the Sunday concerts, has been refused a permit to perform in this country; so have Ross and Sargent.

## FOREIGN ARTISTES

ROGER ECKERSLEY and Cecil Graves have been to the Ministry of Labour about foreign artistes' importation. It appears that a hundred musicians have been admitted recently and only nine refused. The Ministry points out that total exclusion would mean drastic reprisals! The B.B.C. was not, unfortunately, represented at the recent Conference between the Ministry of Labour and variety interests, and it seems clear that foreign vaudeville acts will suffer more exclusion than musicians of rank.

## VIOLET LORRAINE

THE Violet Lorraine programme which was to have been broadcast in January has been postponed until March. It was found impossible to rehearse this fairly elaborate programme while *Good-night, Vienna* was being put through the dramatic panel system. This rehearsing problem will be greatly eased at Broadcasting House, where two separate dramatic control panels will be available.

## IN A TELEVISION CONTROL ROOM



In the television control room of a famous American television station, WCFL, Chicago. The lamp housing and scanning disc can be seen, while the photocell amplifiers are on the left. The arc, of course, projects into the television studio

# BROADCASTING -the TIME SIGNALS



"Big Ben" and the Greenwich "pips" take their special place in the programmes, and here our Special Commissioner describes the way in which these time signals are given

WHEN down in the control room recently, while a programme was on, I happened to be near the London control desk when it was about time for the Greenwich pips to be given.

The engineer in charge gave me warning and we went over to the junction boxes which are at the end of the line coming into Savoy Hill from Greenwich. In these are a stage of amplification and a relay. Everything is switched on by a key switch and jack.

After the complicated means which I had pictured for super-imposing the "pips" on a programme, the almost automatic method of switching came as a surprise.

All the control engineer has to do is to flick the key switch, bringing into circuit the relay and amplifier. The strength of the output has already been balanced so that there is no need to bring a potentiometer into circuit to prevent the "pips" blotting out the programme on which the time signal is super-imposed. An oscillator with "honeycomb" coils produces the pips note.

### "Pips" by Telephone

The B.B.C. is in touch by an ordinary Post Office line with the room at the Greenwich Observatory in which there is a standard mean-time clock. The same type of line has been installed in Broadcasting House, but it is not yet definitely settled where the time signal relay will be. Its most probable place is in the control room on the sixth floor where, incidentally, is the

master electric clock for the whole building.

The standard mean-time clock at Greenwich is driven by weights and is mounted in a sturdy wooden case. A little wheel forming part of the clock train makes contact for the six dots second. This comes into action like the alarm mechanism of a clock and the time signal service is sent all over the country, to other organisations as well as the B.B.C.

At the side of the clock in the Observatory is a board with two switches putting the lines through to the distribution board for Savoy Hill, Westminster and other centres. On another shelf is a carefully balanced relay in a brass case with a glass top, and this transmits the dots to the control room.

The six "pips" give the seconds fifty-five, fifty-six, fifty-seven, fifty-eight, fifty-nine and zero of the hour. The error is generally kept to within one tenth of a second and the Greenwich officials state that the error is generally down to less than one twentieth of a second. So you need have no fear when timing your watch!

The standard mean-time clock is kept correct by observation of the stars. The stars, observed through a special telescope, give sidereal time by reference to the earth's rotation and this has to be corrected for mean time. This is done by calculation and the standard mean-time clock is corrected by having a bar magnet fitted to the pendulum and a solenoid coil underneath.

For correction a current is switched on for a short period. According to

the direction in which it is switched on, the pendulum is attracted or repelled and so the clock is advanced or retarded.

Big Ben gives the time signal at certain programme intervals, such as at 10.15 in the morning on Daventry National and on the London Regional. It also gives the time signal at noon on National, and



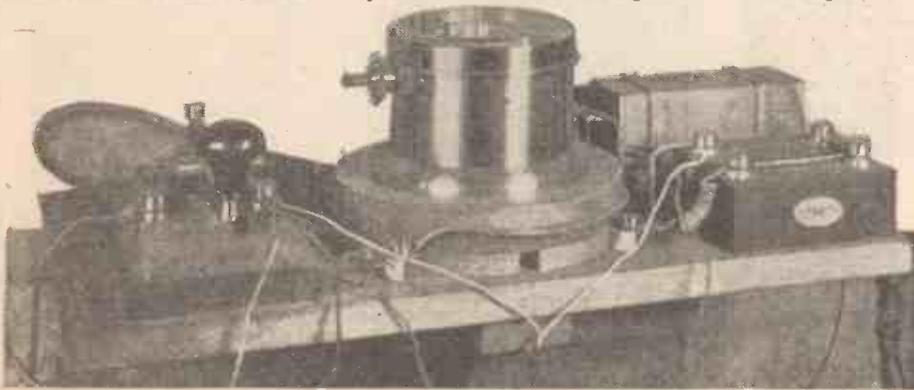
Broadcasting "Big Ben." Close up view of the suspended microphone in the gallery above the bells of "Big Ben." The instrument is enclosed in a protective cover of rubber

London and Midland Regional, Saturdays excluded.

As a matter of fact, the engineers always try to "fade-in" Big Ben at the beginning of any programme emanating from London.

A microphone hung up in a rubber bag from a girder in the tower picks up the sound of the bells. There is an A-type amplifier close to the microphone, and the output of this, through an L.F. transformer, goes on to a Post Office line leading to the control room.

At first the engineers were troubled with extraneous noises reaching the microphone, but by putting it in a new position they have overcome this.



Relay automatically operated by the clock used to pass the seconds dots on to the B.B.C. control room. The key is employed for test purposes only

# HOW YOU CAN IMPROVE REPRODUCTION

## Loud-speaker Realism

EVERY listener strives for realism in his loud-speaker reproduction. Often he strives in vain, because the volume is not just right. Granted a really good loud-speaker, driven from a good set, you will not get realistic results unless the volume of the output is readily controllable.

It really stands to reason that a different level of sound will be needed to give an announcer realism from that needed for, say, a symphony orchestra going all out. But the control of the loud-speaker volume should be made long before the signals reach the loud-speaker.

It is bad practice to attempt to control the volume at the loud-speaker, because this implies that the power valve is being fully loaded all the time and on moderate volume outputs there will then be an unnecessary risk of overloading at the power-valve stage.

The practice of controlling loud-speaker volume by putting a variable resistance across the output terminals is quite wrong, for this means cutting high notes on low volume settings.

## Altering the Tone

Tastes vary enormously regarding the timbre or tone of loud-speaker reproduction. Some listeners are happy only when there is a "healthy" bass-note response, and they do not mind if half the top notes are missing. Others, probably more musically inclined, must have the definition imparted by full reproduction of the top notes, and are quite prepared to

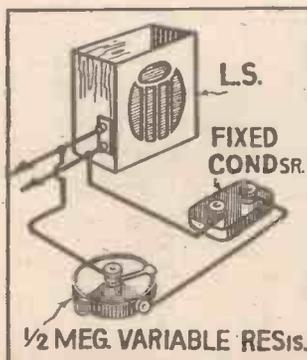


Fig. 1. Showing how a simple filter can be wired up to control the tone

sacrifice some of the bass, particularly if the bass is reproduced in a "boomy" way.

It may interest some readers to know that the tone of the loud-speaker reproduction can be materially altered by changing the impedance of the power valve. For example, a low-pitched tone can be changed to a cleaner tone by putting a pentode in place of an existing

low-impedance power valve. Conversely, absence of bass can often be made good by putting a lower impedance power valve in place of the existing valve.

Another way of modifying the loud-speaker tone is by putting a high- or low-note filter across the loud-speaker terminals. To make a high-pitched loud-speaker sound lower in pitch you must cut off some of the top frequency response, by shunting the loud-speaker with a high-note filter.

Such a filter can be made up with a fixed condenser in series with a variable resistance. Try a .01-microfarad fixed condenser and a half-megohm variable resistance.

## Doping Linen Speakers

There are certain types of linen supplied with kits of parts for linen-diaphragm speakers, which do not need doping with any amyl-acetate compound. In this case you have only to wet the diaphragm slightly and, on drying, it will contract and tension itself. An important point is that this damping should be done lightly with a sponge and must be done evenly all over, for otherwise the strands of the linen will stretch unevenly. Doping with a cellulose compound may be done twice or even three times to make the diaphragm drummy, but you will generally find that a specially prepared diaphragm must be damped only once, and that if any further tensioning is needed, this must be done with the adjusting screws only.

## H.F. Interference in Speakers

A trouble sometimes met with by radio-gram. owners is high-pitched whistling, whenever the set is working in a fairly sensitive condition. This may be an indication that the set is on the verge of low-frequency oscillation, and is a sign of the need for decoupling in the set.

A much more likely cause, though, is the straying of H.F. currents in the low-frequency circuit and speaker windings. A whistle is caused in some sets if the speaker wires are run close to the aerial or around the high-frequency end of the set, and the cure is obvious.

Do not confuse this whistle with the ringing set up by the mechanical vibration of the speaker, causing the power valve or the detector to hum or ring, usually at a fairly high-pitched note.

## Cellulosing Speaker Cones

In the same way that amyl-

acetate doping of a linen-diaphragm deepens the tone, so the cone of an ordinary speaker may be doped, to make it more responsive to the bass. A light coating of one of the proprietary dopes should be given on both sides of the cone and this will have a further advantage in making it non-hydroscopic.

Some types of thin cardboard cone are apt to get flabby in continual damp weather and the speaker in consequence loses its brilliance. A point to note in this connection is that the cone must not be doped if it is suspected of being at all damp. Take the cone off the driving

resistance of about 2,000 ohms and requiring a field current of 100 milliamperes or so—an average value. The connections are very simple (Fig. 2) and no transformer is needed, providing the mains voltage does not exceed 230.

For safety's sake a fuse blowing at  $\frac{1}{4}$  ampere should be put in each mains lead to the rectifier. The 4-microfarad condenser is connected in parallel with the field winding to get the full output from the rectifier and, of course, has no effect upon the performance or tone of the speaker. Where the mains voltage is greatly in excess of



# A SCORE OF LOUD-HINTS

rod and warm it for an hour or so before applying the dope.

## Moving-coil Speakers and the Mains

Moving-coil speakers with energised magnets have temporarily gone out of favour, giving place to permanent-magnet speakers and inductors; the reason is in many cases the difficulty of supplying current

230 a transformer must be used, the connections otherwise being the same. Low-resistance speakers may be fed in the same

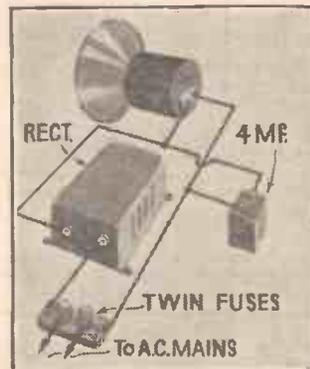


Fig. 2. Simple connections for moving-coil speaker owners who wish to work the field magnet from alternating-current mains

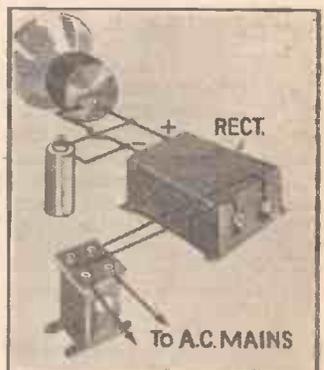


Fig. 3. A similar arrangement to Fig. 2, but for use where a low-resistance battery-type moving coil is to be fed from alternating current mains and a low-tension supply is needed

to feed the field winding. A metal rectifier, though, provides an easy solution. A metal rectifier, such as the Westinghouse H.T.1, is suitable for mains-fed speakers having a pot winding

way. A step-down transformer must be used and an A3, A4, or A6 rectifier should be used according to the resistance and current demands of the field winding. The connections are shown by Fig. 3. No condenser is needed across the pot winding,

# PRACTICAL SUGGESTIONS FOR EVERYONE

as at this low voltage the inductance is generally sufficient for good smoothing and to get the best output from the rectifier. The A3 and A4 rectifiers have a D.C. output of 9 volts at 1 and 2 amperes respectively, while the A6 gives 6 volts at 3 amperes. Choose the most suitable type for your particular pot winding. In certain instances a resistance may be used to cut down the voltage on the output side.

## Stopping Rattle

Nothing upsets the performance of a speaker so much and depreciates its response to bass as rattle set up in the framework or baffleboard mounting. This is a common trouble with linen speakers made up on whitewood frames of insufficient strength. Hardwood, such as oak, is far better for this purpose and the little extra trouble in cutting and screwing the parts together is well repaid. Cone speaker and moving-coils behind a thin

permanent-magnet or energised type, are apt to rattle after they have been working for some while and off-hand it is not easy to find the cause. With permanent-magnet speakers, if the sensitivity has dropped off as well, then one can safely say



Fig. 5. Chatter will be set up if there is lack of clearance between the field coil and the poles of a moving-coil loud-speaker as indicated by the accompanying diagram

that the trouble is due only to loss of magnetism.

The speaker should be sent back to the makers or to a competent magneto-repairer for re-magnetising. This trouble cannot arise, of course, with energised-type speakers. A cause of rattle on both types is

quency amplifying valve, and set up a ringing noise.

This trouble is most likely to develop with a microphonic detector valve, which may work quite well inside a table cabinet but which will cause no end of trouble in a console cabinet. The remedy the manufacturer of consoles adopts is to put in another valve, but the amateur must perforce use up his existing apparatus.

Probably the best way to get over the trouble is to cover the glass bulb of the detector with cotton wool, making a thick pad around it and holding it in position with a rubber band. Often a thick rubber band, made of spongy material, will do the trick.

Still another way, and one adopted by a leading maker of consoles, is to insulate the entire set chassis from the vibration of the loud-speaker by mounting the chassis on rubber blocks.

## Using Cellulose Dope

Whether or not you get good results with a linen speaker, when plain linen doped with a cellulose compound is used, depends largely on the way in which this tensioning is done. Special Titanine dope or amyloacetate (as used for mending celluloid-cased accumulators) may be used, or one of the several proprietary dopes. The diaphragm should be tightened by means of the adjusters, so that it is just reasonably taut but not drummy, and the first coating of dope should be quickly and evenly applied with a small paint brush. Keep the speaker near an open window, as some dopes are not only unhealthy but very inflammable. Allow this first coat to dry properly before putting on a second if this is needed. Each coating of dope will make the diaphragm stiffer and, up to a certain point, will deepen the tone, but too

much dope will make the speaker insensitive.

## Humming Moving Coils

If your energised-type moving-coil speaker hums when you have built up an eliminator to work it direct from the mains, then there is a very easy way of getting rid of this form of distortion. Where the speaker is fed from a high-voltage supply, a 4- or 6-microfarad mains-type condenser should be connected directly across the pot winding. This will smooth out the rectified output of the rectifier supplying the field current. If the speaker is a low-tension type previously fed from a 6-volt accumulator, then a 4-microfarad condenser will not give sufficient smoothing. Try an electrolytic condenser, capable of withstanding a peak of 20 volts or so, and with a value of 1,000 to 1,500 microfarads. This forms a reservoir which keeps the field current constant. The connections are shown by Fig. 6.

## Finding the Best Place

While you should never sacrifice a good position for a set, where a short aerial and earth can easily be obtained, it is, nevertheless, worth while making sure which is the best place in the room for your speaker. A corner position is most advisable because the reflection from the adjacent walls will help to throw the sound out into the room. Also, where a baffle is used, the back of the speaker will automatically be closed in if a board is mounted against the two walls with the fret facing outwards.

## Resilient Mounting

The larger a speaker and the greater volume it has to handle,

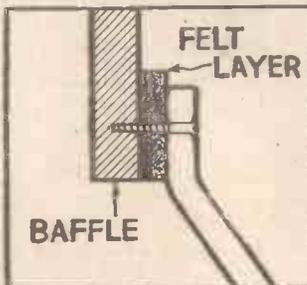


Fig. 7. A suitable method of mounting a speaker chassis to a baffle in order to prevent drumming

the greater tendency will there be for vibration to be transferred to the fret. A ring of felt is usually supplied with a cone chassis and this should be placed as shown in Fig. 7. The wood-screws used to secure the speaker to the baffle (only one of which is shown in the diagram) must

(Continued on page 140)

# OF SPEAKER AND TIPS

baffle often cause the baffle-board to vibrate slightly at some period—generally fairly low—and one suspects the speaker itself of having a resonance at that frequency. If it is not an easy job to provide a stouter baffleboard then do not mount the speaker tightly to it, but rest it lightly against the board through the intermediary of a felt ring.

## Preventing Chattering

Moving-coil speakers, either



Fig. 4. A simple centring adjustment of particular interest to moving-coil owners

lack of clearance between the speech coil and the coils of the field magnet. If there is no proper means of centring, then a star-shaped piece should be fitted across the inside of the cone near the apex and by adjustment the speech coil may be lightly pulled so that it does not foul the magnets. Fig. 4.

## Self-contained Loud-speakers

Among commercial sets there is a big move to include the loud-speaker in the cabinet containing the set chassis and power supply. Such a layout certainly is neat and convenient, but when the amateur tries to put it into practice he may encounter the snag of "singing round the ring," which means that the sound waves from the loud-speaker impinge on the detector, or even a high-fre-

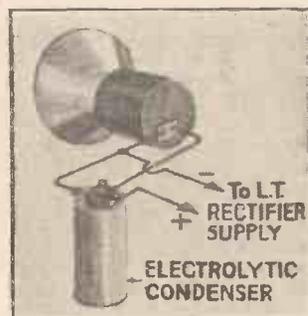


Fig. 6. Hum in an energised moving-coil speaker can be cured by shunting a condenser across the "pot" windings. In this diagram an electrolytic condenser is shown for use with a low resistance coil. An ordinary solid dielectric condenser must be used with a high-resistance coil

# REVEALING A SECRET!

By Leslie T. Barnard

SCENE: A sumptuous apartment at the B.B.C.

1ST EXPERT (*drawing slip from hat*): The word is "vocabulary," gentlemen. How do you propose to—hum—pronounce this word?

2ND EXPERT: At present, I think, the mass of the people lay the emphasis on the second syllable, thus, voCABulary. I propose that we put the accent on the shorter third syllable and pronounce it "vocaBUlary."

3RD EXPERT: Or pronounce it "VOCabuLary." The choice is illimitable with this word, gentlemen.

1ST EXPERT: VOCabulary, gentlemen, or vocaBUlary. Those in favour of the first hold their hands erect. Thank you, gentlemen. VOCabulary, it is.

(*He draws a fresh slip from the hat.*)

1ST EXPERT: The word is "illimitable," gentlemen. The word, strangely enough, that our colleague on the right employed a moment or so ago. Er—exactly how did you pronounce this word, please?

3RD EXPERT (*blushing furiously*): With the emphasis on the second syllable. It is the accustomed way and by a slip of the

tongue I pronounced it in that manner.

1ST EXPERT (*severely*): It is our duty not to condone popular pronunciation by promulgating its use, but to—ah, hum—correct it at every possible point. The mass—ah—put the emphasis on the second syllable. I suggest, therefore, that we instruct our programme announcers to lay emphatic emphasis on the third syllable.

4TH EXPERT (*musingly*): "IllIMITable." A nice sounding word, gentlemen, and I don't think it can be bettered.

1ST EXPERT (*beaming*): Carried unanimously, then. (*He proceeds to draw another slip*). The word is "consecutive," gentlemen.

2ND EXPERT: Again, gentlemen, the public lay the accent on the second syllable.

BUILD THE "ETHER SEARCHER"

FIRST TEST GAVE 40 STATIONS IN 90 MINUTES

Strange the predilection the mass has for the second syllable of a word.

3RD EXPERT: This strange mania must be eradicated, gentlemen and I propose that one of us gives a broadcast lecture on these lines. It should prove of popular interest. •

1ST EXPERT: We will go into that later. At the moment the word under discussion is "consecutive."

4TH EXPERT: I propose that we instruct the announcers to pronounce the word "conseCutive." The emphasis on the third syllable, you will observe.

3RD EXPERT: The choice seems apt. In fact, in view of the inveterate—

1ST EXPERT: Gentlemen, gentlemen. Did you notice how our colleague pronounced the word "inveterate?"

2ND EXPERT: It is the second time that this gentleman has pronounced a word in the manner that the mass of the people pronounce it. This pernicious habit must be stopped.

3RD EXPERT (*triumphantly*): "PerNICious," sir, with the C hard, not PERNicious with a soft C. Your own pronunciation leaves much to be desired.

1ST EXPERT (*soothingly*): Come, gentlemen, come. We are delaying the proceedings. See, I will draw another word from the hat.

*And so the vital work proceeds!*

## "A SCORE OF SPEAKER HINTS AND TIPS" (Continued from page 139)

not be tightened up to the limit. For otherwise the resilient effect of the felt ring will be damped out.

### Using Your Gramophone as a Speaker

Speaker adaptors can be obtained which clamp on to the tone arm of a gramophone and make use of the gramophone horn as the radio speaker. As the units for this job are of the ordinary diaphragm type used in horn speakers, popular several years ago, there is generally a good high-note response, but a noticeable lack of bass. If your gramophone is of sound construction there is no reason why you should not try this method of reproduction, especially if a high-note filter, as previously described, is used to prevent a preponderance of "highs."

### Beware of Big Frets

A fancy fret on a baffle-board undoubtedly improves the appearance, but take care that the fretwork of this is of a very open nature. If there is a lot of woodwork in the pattern, then not only will the volume be cut down, because of the decreased opening to the cone, but resonances will be set up.

### Remote Control

Where the H.T. and L.T. circuits of your set are remote controlled so that it can be entirely switched on and off from another room, there is a natural temptation to put a variable resistance directly across the speaker in order to

get remote control of tone. This is a very ineffective way and one of the previously described methods of tone control should be used with a separate pair of extended leads for the shunt circuit. The only tone control which can effectively be done directly across the speaker is by means of a condenser and resistance in series to limit the high-note response.

### Decorating a Cone

Large cones can be rendered more attractive by transfers or by some hand-done decoration in oil colour. It is inadvisable to use too much colouring matter though because it may make the cone flabby, which will cut down the effective volume of the speaker and will certainly affect the tone.

### Take Care of Polarity

Speakers which are fitted with an integral choke or transformer input unit can with impunity be connected either way round to a set. The leads of simpler type speakers are always marked in some way for polarity and it is most important to put the positive speaker lead to the positive terminal of the set—that is, to that terminal which goes direct to the high-tension supply, not to that which goes to the anode of the output valve.

### Pick-up from the Set

In transportables a frequent cause of instability is stray coupling between speaker windings and a transformer or

choke in the set itself. This can be stopped in many ways. Often earthing the speaker frame is effective. A most satisfactory and direct way, though, is to change the speaker position so that there is no mutual induction.

### "Tuning Up" Reed Speakers

Simple type reed and balanced-armature speakers, provided with an adjusting knob should occasionally be checked to see that the reed or armature is not fouling the poles on loud notes, nor that it is not too far apart so that the speaker is not giving its full output. While the set is working, turn the knob until a loud click is heard and reproduction becomes very tinny, indicating that the pole magnets are being touched. Then turn the knob back a trifle—only far enough to prevent a rattle on loud notes.

### Loud-speaker Demonstrations

When you enter a radio store to buy a new loud-speaker, it is most important that you should carry with you certain facts about your set, its output valve, the power supply, and the type of room in which the loud-speaker is going to be installed. You may be perfectly satisfied with the results given by a loud-speaker in the store, but terribly disappointed when the same speaker is tried out at home.

The reason for this sad state of affairs, examples of which are all too common, is simple—the results obtained from any given

loud-speaker depend so much on the external conditions.

Here are some of the most important points: bear them in mind and you will choose the most suitable loud-speaker. Firstly, decide how much volume you want. This will depend on how you use a wireless set; if only as a background, a small output will do, and there is no need to go in for an expensive model. If you listen on a more ambitious scale, and desire ample volume it is better to get a moving-coil loud-speaker.

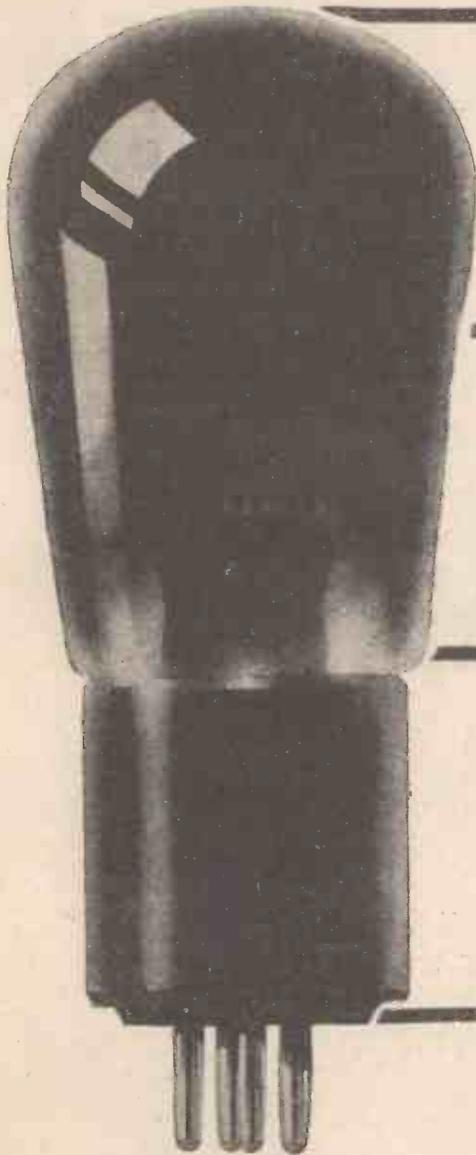
But before investing in such a type, make sure the output valve and the power supply are adequate. Nothing less than a P2 and preferably something even bigger is wanted for the output valve to drive a moving-coil really well.

The choice of a larger power valve must not be made until you can assure an adequate power supply—at least 150 volts at, say, 15 to 20 milliamperes anode current.

There are many small moving-coil loud-speakers on the market, but in general it is doubtful whether they are any better than well-designed moving-iron or inductor-dynamic cone loud-speakers. The only claim to superiority of the cheap moving-coil is reproduction of the lower bass, say down to 50 or 75 cycles. But there is no point in getting such a loud-speaker unless there is a good power supply, for without power bass notes cannot be reproduced on any loud-speaker.

# FROM POWER TO SUPER-POWER THE MULLARD WAY

## P.M.202



Super-power output **WITHOUT** INCREASING LOW TENSION CONSUMPTION. That is the MULLARD way, and the P.M.202 is the valve that will do this for you. Here are the facts.

P.M.202 is a super-power output valve. Its filament consumption is 0.2 amps., the same as that of an ordinary power valve, and substantially less than that of most other super-power valves.

Moreover, its characteristics are absolutely up-to-date and highly efficient, with the result that its output is the maximum obtainable from a valve of this type, combined with unequalled quality of reproduction.

P.M.202 is intended for use as an output valve in battery-operated receivers where considerable volume is required, and where the available signals are greater than can be handled without distortion by an ordinary power valve.

# Mullard

**THE · MASTER · VALVE**

It is British Made, by British Labour, and costs 13/6.

*Advt. The Mullard Wireless Service Co., Ltd., Mullard House, Charing Cross Road, London, W.C.2*

*Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention*

*Arks*

**FORMO** Triple Wave  
THREE

BUILT AROUND THE FAMOUS



MAZDA VALVES

PRCV. PAT.



**KIT COMPLETE**

**£35.00**

AN AMAZINGLY SIMPLE SET TO BUILD AND HANDLE WONDERFUL RANGE & SELECTIVITY

This easily constructed Kit provides you with the opportunity, never offered before, of tuning-in to the world's ultra short-wave stations in addition to the host of medium- and long-wave broadcasts—by the simple turn of a neat panel switch.

**NO COIL CHANGING**

Another feature of this wonderfully efficient three-valver is that when the wave switch connects the ultra-short coils in circuit with the detector valve, it simultaneously reduces the capacity of the .0005 tuning condenser to .00015 through a small mica condenser and thereby enormously improves reception.

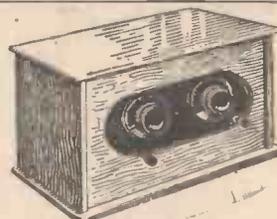
The efficiency of the Kit is assured by the use of the famous **MAZDA VALVES** numbers P220A, L2, and HL2, which are obtainable from all Radio Dealers.

**GET THIS FREE BOOKLET**

Components, without valves, are supplied already mounted in position and the simple wiring instructions are described and illustrated in this Booklet, obtainable FREE from your dealer or address below.

**TRIPLE WAVE COIL ONLY Price 17/6**  
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**ARTHUR PREEN & CO. LTD.**  
Golden Square, Piccadilly Circus, London, W.1



**"INTERNATIONAL" STRAIGHT 3 VALVE SET, 45/- Each.**

Those who desire entertainment from B.B.C. Broadcasts or from European Stations without complicated adjustment will readily appreciate the advantage of a Straight 3-Valve Set, employing Dual Range Tuning for Long or Short Waves, Super Detector, and two first-class Stages of amplification. The whole mounted on a special metal Chassis and fitted in an Oak-finished Cabinet. This is a fine set. Not only will it do justice to your loud-speaker by feeding it with pure output at full volume, but its simple tuning will be welcomed by the family, the least expert of whom can tune in foreign stations with ease.

IF COMPLETE WITH VALVES AND BATTERIES 70/- 2/6 reduction off above two prices if advert. is sent with order.

**Another "UNIVERSAL" Sensation**

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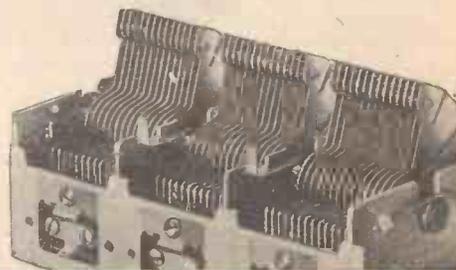
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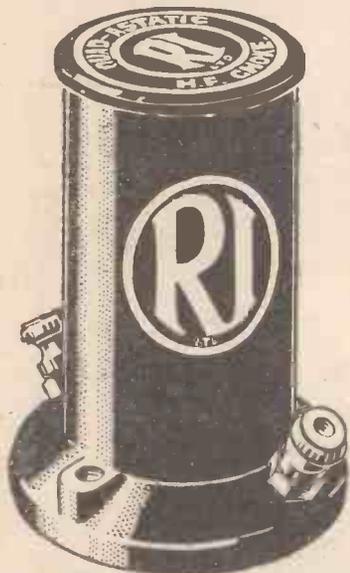
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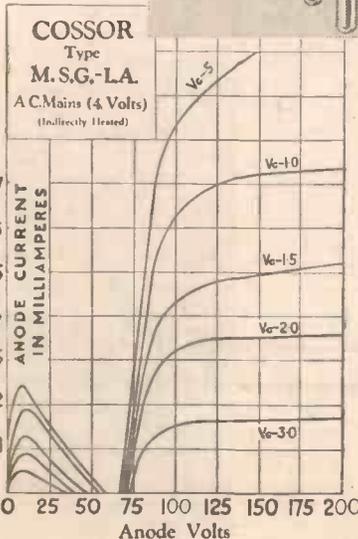
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# Oh You Waverers!

## A NEW FUSION

**I** NOTICE with great interest that the various concerns owning the patents which cover radio-grams have decided to pool their rights and to accept an "omnibus" royalty. This is a good idea and should be a considerable help to the development of the cheap but good radio-gram. There is no reason, as AMATEUR WIRELESS and *Wireless Magazine* have shown by their constructional articles, why excellent radio-grams should not be produced at reasonable prices. One big step forward, I feel, is the announcement that radio-gram royalties will not be at one fixed price for each valveholder or anything of that kind. They are to be a small percentage of the retail sales price of the set. That is the right system, for it is obviously ridiculous that a *de luxe* five-valve radio-gram costing, maybe, £70 or £80, should pay the same royalties as a simple affair priced at round about £25.

## WERE YOU THERE?

**D** ID you by any chance attend the G.P.O. Telephone Exhibition for youngsters of all ages? If you didn't you missed something, for it was a good show. Perhaps you happened to be there as I was, on the opening day, when many thousands of kiddies converged upon it from every point of the compass. Something like a deluge was threatened, and the display might have been pretty well swept out of existence by sheer weight of numbers, if it hadn't been for prompt action on the part of the authorities. Even as it was, thousands of pounds' worth of damage was done to delicate and expensive apparatus during the opening hour or two, for all the switches were within the reach of the kiddies, whose one desire was to twiddle anything that could be twiddled. I am told that a valuable cathode-ray oscillograph went completely "west."

## CRITICAL "THERMION"

**T**HOUGH, as I have said, it was a good show, it did strike me that certain things could have been improved very considerably. The cinematograph films, for instance, were not too well titled. The titles were often long and written in such a way that even adults had to do a bit of thinking to see exactly what they were driving at. Carping criticism No. 2: Why—oh, why—did they adopt that absurd way of showing the passage of wireless waves from point to point that has caused the man-in-the-street to misunderstand rather than understand what happens? On the film we saw a transmitting station in America separated by an expanse of sea from a receiving station in this country. Then, like a row of illuminated hairpins, "waves" wriggled across from aerial to aerial. The hairpins

remained the same size all the way and they appeared to travel along one narrow path. John Citizen immediately says: "Yes, I can see the waves going across from station 'A' to station 'B,' but what happens to station 'C,' which is right off the map? I know that reception takes place there, too; but how can it if waves travel in a straight line like this?"

The waves might, of course, be shown as going out from the transmitting station in more or less concentric rings. That would be better, but again John Citizen is puzzled. "Quite so," he says, "I see that station 'A's' transmitter can now reach 'B' and 'C' and 'D,' and so on. But I know that reception is perfectly possible in an aeroplane, and not merely by a station at ground level." You see at once that the wrong idea is put into people's minds by this kind of "simple" explanation, and if you were a writer on wireless subjects you would know that any such exposition would mean a flood of letters from puzzled readers.

## SUNDAY PROGRAMMES

**I** AM glad to see that the lay press is once more calling attention to the British brand of Sunday wireless programmes, a matter to which I have frequently referred in these notes. No sensible person wants to introduce anything like the "Continental" Sunday into this country; but equally no sensible person wants Sunday to be a day of gloom. It is, after all, the one day in the week that most people have for rest and relaxation. There is no question that more use is made of wireless sets on Sunday than on any other day of the week, and Heaven knows how many more watt hours would be supplied by batteries and mains if only the home stations provided the kind of programmes that we have the right to expect from them. The first grouse that I have is that the Sunday programme hours are far, far, too short. Except for an announcement about the usual deep depression over Iceland from 5XX in the morning, all of our stations are silent until 3 p.m. Then there is usually a gap from 5.30 until 8 p.m. The evening entertainment programme does not start until 9.5 p.m., and it lasts but an hour and twenty-five minutes.

## SOME SUGGESTIONS

**I** T seems generally agreed that church services should be broadcast, but many people would like to see the times of these altered. It has always seemed to me that the people who listen to the wireless services are mainly those who are prevented by illness, by stress of weather, or by some other cause, from attending their own place of worship in person. An evening service beginning at 8 o'clock is certainly too late for invalids, and I am sure that a morning service from,

say, 11 to 11.45 a.m., would be much appreciated. And why not give the evening service between 6.30 and 7.30 p.m.? There can be no objection to broadcasting services at times when those at the churches are in progress, for this is already frequently done when Welsh and other services are relayed.

## THE MIDDLE DAY

**I** SUGGEST that we do want really good musical entertainment between midday and 3 p.m., when there is now nothing whatever to be heard. The Regionals could transmit light music, the Nationals some slightly more solid fare. Let the afternoon programmes remain much as they are from one set of stations, but brighten the programmes from the others. The evening entertainment programmes should start at 8 o'clock, giving us two and a half hours instead of less than one and a half. Were I Director-General, as it is exceedingly unlikely that I ever shall be, I would concentrate a large part of my energies on making the Sunday programmes the best and brightest of the whole week. It can be done without giving offence, for bright programmes do not mean necessarily red-nosed comedians or anything of that kind.

## WHEN MY SWITCH FLICKS OFF

**J**ACK PAYNE, I am sorry to hear, is to leave the B.B.C., and my regrets would be deeper if only he (or was it some other member of the orchestra?) had not had that appalling singing complex. I like dance music and I like singing. But I do utterly loathe, detest, and abominate the nasal bleat which seems to be regarded as necessary for the rendering of the vocal refrains of dance tunes. The instant that the vocalist of the orchestra bursts into song, flick goes my switch. I suppose that some people must like this kind of thing or they wouldn't do it. What fills me with horror and dismay is to read a statement in my morning paper by Mr. Henry Hall, who is to succeed Mr. Jack Payne in March. "I shall make," says he, "a speciality of vocal refrains . . ." In that case, Mr. Hall, I am afraid that "Thermion's" filaments won't do much glowing whilst you are performing.

## A BACK NUMBER

**S** INCE every broadcasting dance band seems to be filled with the same urge to bleat and whine, I began to think that there must be a big popular demand for this sorry business, and fears that I might be becoming a back number assailed me. I find, though, that my youngsters are just as quick as I am off the mark in making for their switches when the catawauling begins. In fact, of dozens of people of all ages whom I have asked

On Your Wavelength! (continued)

whether they liked singing by a jazz band, not a single blessed one has said "yes." They were unanimous in saying that they would enjoy the dance music ten times as much if there wasn't any singing. Really, I do not wonder; for, quite apart from the bleating, the words are, in most instances, the worst imaginable kind of "tripe." It is customary for the young to accuse their elders of having spent their youth in an atmosphere of Victorian sentimentality. I can assure them and they can verify the facts for themselves—that the sloppiest song of twenty years ago was a robust piece of virility compared with the average dance refrain of to-day.

A RA(Y)DIO FANTASY

IN his broadcast play *Love One Another*, Mr. du Garde Peach presents a picture of the world under the influence of a newly discovered "ray" which makes it impossible for any person to hate or envy another. Unfortunately the effects of the ray turn out to be very different in practice from what was anticipated in theory and the scientist responsible is made to pay dearly for his ambitious experiment on the human race. Apart altogether from the merits of the play, as a play, the idea of using some form of "curative" radiation on a large scale has a certain fascination. Any attempt to influence human conduct by such means is, of course, purely fantastic, but something might, perhaps, be done to attack epidemic disease. For instance, suppose an inventor could discover just the right kind of vibration to give the influenza germ a nasty jolt. Half an hour's transmission of the right frequency, say twice a day, from "all stations," might then save lots of people all sorts of pains and aches. And if influenza, why not other noxious germs which are propagated through the air?

SYNCHRONOUS CLOCKS

THERE seems to be something of a boom in synchronous clocks. With the linking up of much of the "grid" scheme through the transmission lines which are now becoming a familiar feature of our countryside, it has become necessary to standardise the frequency within very close limits. This being so, the frequency of the supply becomes an accurate measure in time, and an electric clock driven off the A.C. mains keeps the most extraordinary time, never varying from one week to the next, and what is more important with me, never requiring to be wound up! Personally, I find them the most fascinating things. Most of the types have a second hand or disc which travels round continuously to show that the clock is working, and to see this hand creeping steadily round without any jerk or step-by-step motion is quite entertaining.

The first clock of this type which I saw was also provided with a date arrangement, so that it not only told the time, but the correct date from day to day. Of course, such a device requires re-setting at the end of the month, as otherwise it continues to run on and on.

Another rather interesting thing which I found with these clocks is that periodically they give very slight rattling sounds. The noise is barely noticeable, but in comparison with their usual silent running, one can detect the difference. This rattle presumably occurs when the frequency of the supply is undergoing correction. It only lasts for a minute or so, and then reverts to its normal silent running. Perhaps some reader can confirm this explanation.

ONE-KNOB SETS

IN the February issue of *Wireless Magazine*—I have been privileged to see an advance copy as it came from the printers—there are two sets with one-dial tuning control. The more important set of the two is called the Quadradyne; it is a four-valver with two screen-grid stages and four tuned circuits. It is thus obvious that a four-gang condenser is used. Two of the coils are for an aerial band-pass unit, while the other two are tuned-grid coils associated with the high-frequency valves. This set, as one would expect, is very selective and powerful; no fewer than forty-five stations were received during the course of a three-hour test. It is an important step forward that such results can be obtained with only one tuning knob.

This issue of *Wireless Magazine*, by the way, is a special constructor's number. There are descriptions of four sets to build. I was also specially interested in two of the other articles. One is by P. K. Turner; he is a real fiend for quality, as you may know, and describes how to get really good reproduction at small expense with a special push-pull circuit. The second article that attracted me was by F. E. Henderson, who knows more about valves than most people. He is writing about the new variable-mu type and his explanation of its merits struck me as being particularly easy to follow. Two of these valves, I was interested to note, are used by W. James in the 1932 A.C. Super 60, also described in the same issue.

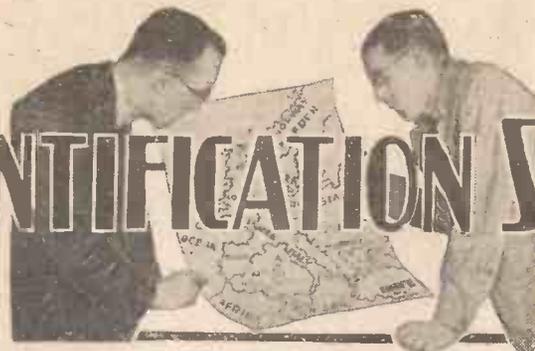
*Wireless Magazine* is certainly still living up to its boast of being the "best shillingsworth in radio"; there are fifty-odd features in this February issue.

THERMION.

Let "A.W." Solve Your Problems



# STATION IDENTIFICATION SIMPLIFIED



Some Helpful Hints

By J. Fletcher Tempest

**E**VEN fairly experienced listeners often find great difficulty in identifying a foreign station. The absolute novice has that same difficulty multiplied many times over. While it is hopeless trying to lay down rigid rules for identifying purposes, still a great deal can be done to assist those who despair of being able to tell Riga, let us say, from Vienna.

### Start on the Long-wave Band

For convenience, begin with the long-wave band, because stations on this band are generally the easiest to log. The medium-wave band is badly overcrowded, whereas there is plenty of space between most of the stations on the higher wavelengths.

Kaunas is at the top of the long-wave band, for he works on 1,935 metres. There should be no mistake about spotting this station. Its position is several condenser readings above Huizen, on 1,875 metres. Though both stations have a man announcer, the call from Kaunas is quite distinct, and also it is a point worth noting that the signal strength of the Lithuanian station will be much feebler than that of Huizen. On the ordinary set Kaunas will be inaudible during the daylight hours, but Huizen can be heard at any time.

Below Huizen is Lahti, which is a station seldom heard in this country. Its position lies midway between Huizen and Radio Paris. The last-named station is surely too

familiar to require attention. Konigs-wusterhausen (Zeesen), sandwiched between Radio Paris and Daventry National, is, on all but the ultra-selective receivers, hard to separate from its neighbours. Working on 1,481 metres is Moscow (Old Komintern), a station only heard, as a rule, when Daventry and Eiffel Tower (1,445 metres) are silent.

Next to Eiffel Tower on the downward scale is the giant Polish station, Warsaw No. 1, its wavelength being 1,411 metres. There can hardly be any doubt as to whether this station or Eiffel Tower is calling, since the two languages are utterly different.

Motala (1,348 metres) relays Stockholm programmes, and is awkward to separate from Warsaw No. 1. To ascertain whether a broadcast you suspect to be Motala really comes from this station, verify your suspicion by tuning Stockholm (436 metres).

### Russian Stations

On 1,304 metres will be found Moscow (Trades Unions). Frequently talks and announcements are made in English as well as Russian. On 1,200 metres comes Reykjavik, the Iceland station, not often picked up in this country. Should there be doubt as to whether a programme received comes from Moscow or Reykjavik, it is worth noting that, with a frame aerial having directional properties, Reykjavik's position lies at right angles to Daventry, but Moscow lies at about 70 degrees.

Kalundborg (1,153 metres) can readily be identified by the single stroke on a gong which precedes every announcement. Nor should Oslo, on 1,083 metres, produce confusion, since the call is usually quite unmistakable.

Tiflis (1,060 metres), Leningrad (1,000 metres), and Kharkov (937 metres) are three Russian stations at the lower end of the long-wave band which may be tuned in often with little difficulty. Their individual identification can be solved, as a rule, by the dial readings alone, otherwise the calls are similar and very frequently they relay Moscow. On a great many sets the long-wave readings do

not descend below 1,000 metres, so Kharkov may not be heard at all.

### The Medium Waves

Identification of stations on the medium-wave band, to which we will now turn, is generally much trickier because of the multiplicity of stations, many of them practically on the same wavelength.

On some sets the readings at the top end of the scale begin at 600 metres, in which case Ljubljana (574 metres) is at the head of your log, being recognisable by the interval "cuckoo" signal. Budapest, on 550 metres, is a powerful signal under favourable conditions, with a distinctive musical note for opening and intervals. Should you find a station between Ljubljana and Budapest, probably it is Augsburg relaying Munich. This can, of course, be verified by tuning Munich (533 metres). However, above Munich (interval signal a musical box and siren for opening signal), but below Budapest, may be found Sundsvall, which relays Stockholm. From now downwards the stations should come in thick and fast with one for almost every dial degree.

Riga can be distinguished by the very lucid call, "Hallo Riga!" usually given by a woman announcer, in contradistinction to Vienna's man announcer and call, "Hallo! Hallo! Hier Radio Vien. . . ." Riga works on 525 metres, Vienna on 517 metres.

### Interval Signals

Brussels No. 1 should cause no difficulty, working on 509 metres, while on 501 metres is Milan, with the song of the nightingale for an interval signal. On 487 metres, or immediately above the North Regional, is Prague, often a tricky station to tune, but hardly likely to be confused with any other. Langenberg is also conspicuous for its place next below North Regional, after this coming Beromunster, the powerful Swiss station, on 459 metres. If doubtful whether you have got Langenberg or Beromunster, listen for the interval signal. In the former case it consists of a chime of five bells, and in the latter it is two notes on a clock regularly repeated.

Rome (441 metres) is clearly identifiable from its call and the almost inevitable woman announcer. Stockholm can be separated from Rome with a frame aerial by turning somewhat between the Rome and Daventry positions. This also affords a means of identification.

Late at night Madrid, on 424 metres, may be found, but earlier Berlin Witzelben is more likely, being 418 metres; the entirely different languages are recognisable.

## MAKING A GRAMOPHONE RECORD



Sir Edward Elgar conducting the London Symphony Orchestra in the new H.M.V. Gramophone studio. This is an enlargement of a Pathetone news film now being shown in many cinemas. One of the recording microphones can be seen at the back

**A 25/- "TWO" WITH A REMARKABLE PERFORMANCE—NEXT WEEK.**

# SELECTIVITY AND SIMPLE SETS

Although new band-pass and filter circuits in modern sets give very sharp tuning, there are still many simple old-type outfits in use which need greater selectivity

**D**URING the last week or so I have been called in to give friendly advice in two cases where old-fashioned sets of extremely simple variety were being deluged by foreign-station volume. Even the local B.B.C. stations had a background of Germany!

"It's all very well for people who can afford new sets," said one of the owners of a flatly tuned outfit. "What I should like to see are some simple ideas which will enable old sets to carry on for a while, without being swamped."

I investigated both cases. Every ordinary precaution had been taken.

The aerials in both instances had been shortened and in one case an indoor aerial had been fitted instead. The tuning arrangements of both sets embodied plain-circuit connections.

One had an old multiple tuner and the other a reasonably efficient solenoid coil, wound on an ordinary former, 2½ in. in diameter.

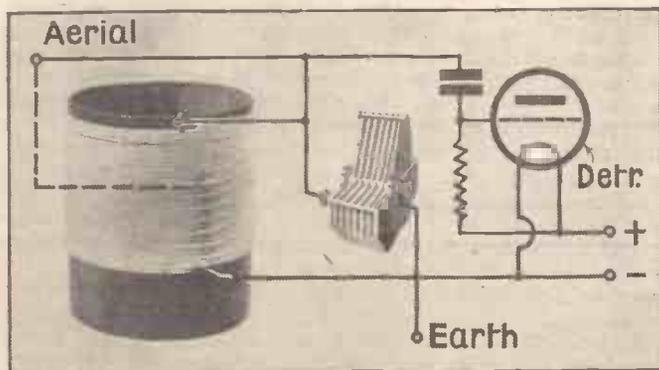
## A Dual-range Coil

This latter seemed more susceptible to improvement. The multiple coil was scrapped in favour of a simple dual-range coil with a shorting switch for the long-wave winding, costing only a few pence as it was wound at home.

The second set, with the coil arrangements which were subsequently modified, is more typical of the average old set and the schemes we tried to get sharper tuning are of very general interest.

In the end we did manage to get extremely good tuning. The owner of the set reckoned that he can carry on for another year without too much interference if the Prague plan experts don't get busy again!

As a first step the aerial connections and the tuning condenser were cleaned. Dust had crept in between the vanes and the high resistance leaks all over the place were flattening out the tuning curve. Five minutes of prodding with a pipe-cleaner



These are the connections for an intermediate tapping on a plain solenoid coil of the type described in the accompanying article. The dotted line shows the new connection to the tapping

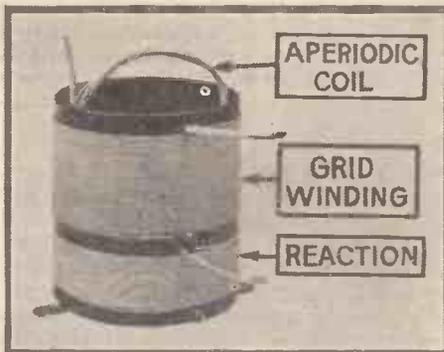
removed crackling noises and made the condenser control more effective. There was, of course, a pre-set condenser

in the aerial lead. The owner of the set had been told that this was the most effective way of getting selectivity. Unfortunately the coil arrangements were wrong. That is the root of the trouble in most cases of poor selectivity.

First of all, I found that the aerial was connected to the top end of the coil, at the same point as the wire going off to the grid condenser. I left wire as it was and, removing the aerial wire, made connection with it about 20 turns down the coil. This intermediate tapping made a noticeable difference. Things looked hopeful!

## Fitting an Aperiodic Winding

A skein of 24 d.c.c. wire was unearthed from the junk box and 40 turns of it were wound around the main section of the tuning coil (not over the reaction winding). One end of this was connected to earth—as a matter of fact, it was to the negative filament terminal on the detector valve holder, and the other end was connected to the aerial.



This shows how to mount the variable selectivity coil mentioned

In this way we coupled the aerial to the grid coil by an aperiodic winding. This gave still sharper tuning than when the intermediate tapping was taken to the coil.

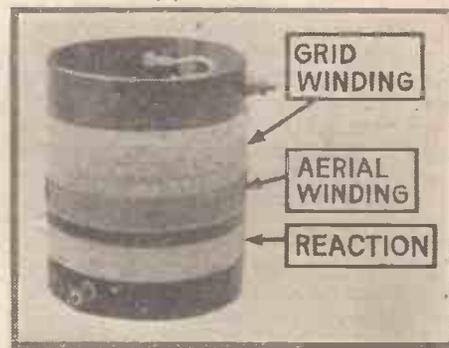
"What happens if you use fewer turns?" I was asked.

We took off ten turns, tried the set and then took off another ten turns, leaving only 20 on. Each reduction made the tuning a trifle sharper, but there was not much difference between the 20 and the 30-turn winding in selectivity. There was, though, a big drop in volume, very noticeable on foreign stations.

Then we took off all the turns and, on a scrap piece of cardboard former we wound a 40-turn coil, with the turns bunched together. This was slipped off the former and short ends

of insulating tape were bound round the ring of wire at three points, to keep the turns together.

The diameter of this was just sufficient for it to be a push fit inside the former of the aerial coil. It was connected in the same way as the first winding tried, namely, one end to aerial, and the other end to



The arrangement of windings for the aperiodic coupling described

earth, the aerial being totally disconnected from the actual aerial coil. As the new aperiodic winding was a push fit inside the aerial coil we could vary its position.

When it was "flat," and in the same plane as the windings of the aerial coil, there was the most coupling and B.B.C. stations came in strongly and without interference. For good foreign station reception the inner coil was twisted a little so that the coupling was reduced and a little more reaction was used to bring the signal strength back to normal.

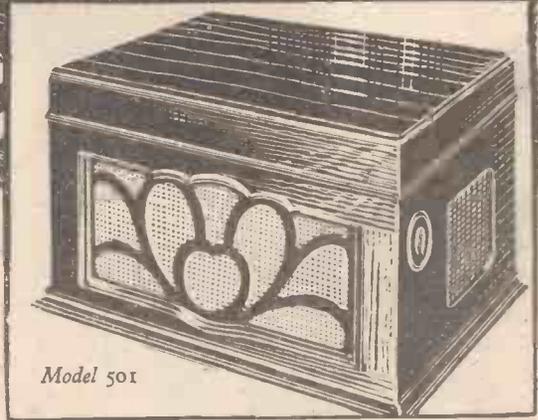
Where plug-in coils are used in a set having only one coil socket, an aperiodic winding of this kind could be pushed inside the aerial coil former.

These simple hints do not constitute epoch-making inventions! Aperiodic aerial coupling is used in some tuners, but many owners of old sets don't know how to take advantage of this more selective coupling. K. U

## AT THE QUEEN'S HALL

**O**N January 13 the programme included two old favourites and a Notturmo by Mozart for "four orchestras"—not four full orchestras, but the usual orchestra divided into four. The piece was delightful.

Brahms' First Symphony was performed with real distinction, especially the second and fourth movements. Dr. Adrian Boult is a great Brahms conductor. The melody of the second movement and the tempo and rhythm of the fourth were of a higher standard than I personally remember elsewhere. I have yet to hear a performance equally good of the Unfinished Symphony. It was spoilt to-night by treating it as though it were Brahms—which is worse than the practice at some concerts of treating it as if it were all honey. L. R. J.



# Read what Press Experts say about the 29 - Guinea

## "His Master's Voice" Radio-Gramophone

"The quality of reproduction of both broadcasting and gramophone records is of the high standard one expects from H.M.V. products. A full round bass is balanced by crispness in the upper register without over-emphasis of sibilants or objectionable needle scratch. The last valve is capable of supplying an undistorted output of 1.4 watts, and the volume from gramophone records is such that most people will find the volume control an indispensable accessory . . . It goes without saying that the quality of material and standard of workmanship in the chassis is irreproachable, while the finish of the cabinet work is of the customary H.M.V. excellence."

"Wireless World"

"An unusual type of set is the H.M.V. model 501 three valve table radio-gramophone. Included in the table cabinet is a three valve all mains set, a moving coil loudspeaker, gramophone pick-up and electric motor. The price is 29 Guineas, a figure that should appeal to many set-buyers wanting radio-gramophone reproduction without the expense usually associated with radio-gramophones."

"Wireless Magazine"

"A remarkable engineering achievement and an instrument deserving of the highest praise. The radio performance is of a very high level with the gramophone side equally efficient."

"Music Seller"

"Reproduction was of the highest possible standard, the bass is not overdone and the higher frequencies are reproduced with utmost pleasantness. Selectivity was astonishingly good for a three-valve circuit. A considerable range of stations was secured."

"Evening Standard"

"For three valves the set has excellent range, and the quality of reproduction left nothing to be desired. There is a complete absence of background valve noise and the combined reaction and volume control give pleasantly smooth operation."

"Daily Mail"

"Tests soon proved the excellence of the Model 501 radio-gramophone under working conditions. All the laboratory staff agreed with me that the quality of reproduction is outstandingly good. This applies to the loud and soft settings of the volume control. On the radio side it was evident that selectivity, even with a fairly long aerial, is above the average. I found the wave-length calibrations quite accurate enough to locate distant stations, of which a large number have been logged."

"Amateur Wireless"

"Britain has beaten America for quality and price in the production of gramophones and radio-gramophones . . . A table model radio-gramophone for twenty-nine guineas is one of the outstanding achievements of the company."

"Daily Express" Scottish Edition

"I have now had the opportunity of testing the Model 501 radio-gramophone and I think that this three-valve 'all-electric' instrument is the most compact radio-gramo. of its type that I have seen. The results on test proved the receiver to possess good sensitivity and selectivity. The set is capable of bringing in most of the stations worth listening to on the medium and long wave bands. The power on the gramophone side is all that can be desired, and the reproduction sets a very high standard."

"Wireless Constructor"

"Though this receiver has only three tuned circuits selectivity is good. Either a mains aerial or a short indoor aerial can be used with good effect . . . the moving-coil speaker delivers very good quality, and an excellent volume control enables strength to be adjusted nicely to requirements acting on both radio and gramophone."

"The Observer"

"It is devoid of 'frills,' but still of neat appearance, sturdy and compact, and above all is as efficient on both the radio and gramophone sides as some of the larger and more expensive instruments we have heard . . . The instrument is excellent value for money."

"The Gramophone"

"The radio side pleased us as much as the gramophone side, which is really saying a good deal!"

"Wireless Magazine"

As to any "His Master's Voice" dealer for full descriptive Illustrated Brochure, and full particulars of Hire Purchase Terms.

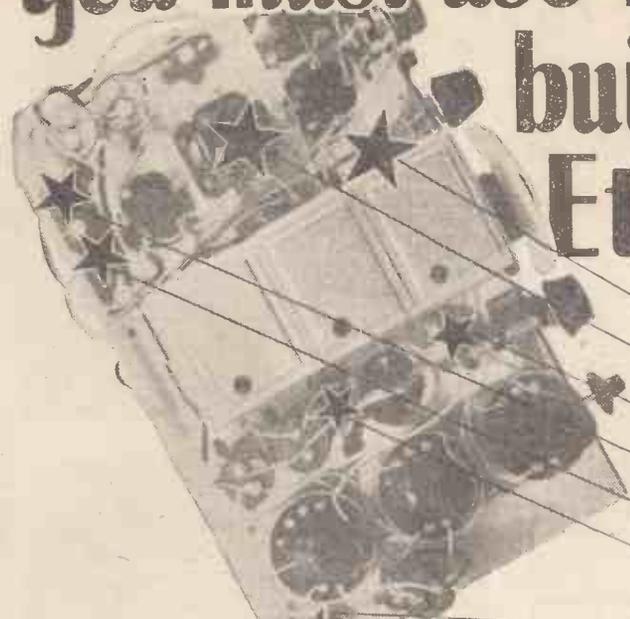


# His Master's Voice

The Gramophone Co., Ltd., London, W. 1.

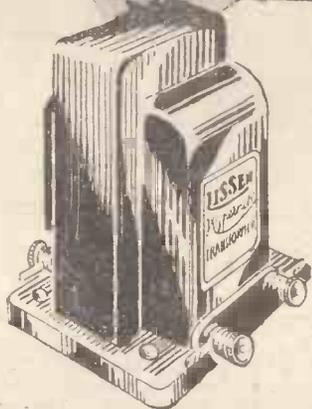
You Will Help Yourself and Help Us by Mentioning "A.W." to Advertisers

# You must use LISSEN parts to build the real 1932 Ether Searcher



- LISSEN FIXED CONDENSER 1/-
- LISSEN GRID LEAK 1/-
- LISSEN FIXED CONDENSER 1/-
- LISSEN "HYPERNIK" I.F. TRANS-FORMER 12/6
- LISSEN DISC-TYPE H.F. CHOKE 2/-
- LISSEN TERMINAL BLOCKS 1/- each
- LISSEN TERMINAL BLOCK 1/-

USE the Lissen parts specified in the 1932 Ether Searcher. The designers wanted real distance-getting, real power, real purity of output. You will get the results intended ONLY if you use Lissen in your 1932 Ether Searcher.



## The LISSEN

### HYPERNIK L.F. TRANSFORMER

The designers of the Ether Searcher have used this transformer in the actual set because they could not get such a good response curve—such fine quality of reproduction—from any other transformer at anything like this price.

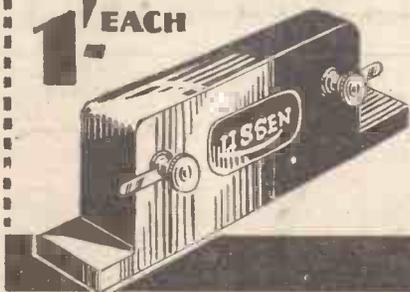
With a primary induction of fully 100 henries, it yet operates perfectly when passing currents up to 5 mA. or more. Its step-up ratio is 4 to 1, and a stage amplification of more than 100 is obtained.

**12'6**  
PRICE

### LISSEN FIXED CONDENSERS

These Lissen Mica Fixed Condensers are leak-proof. They never vary. They deliver all their stored-up energy. Guaranteed accurate within 5% of marked capacity. Can be mounted upright or flat. Grid-leak clips included free with each condenser. .002 to .006, 1/6

**1' EACH**



### LISSEN FIXED GRID LEAKS

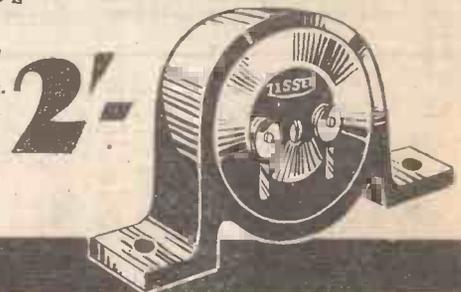
It is of utmost importance that resistances should be unvarying in value and free from defects which may cause parasitic noises. Lissen Resistances have been tested by exposure to rain and sun, and they remain constant and silent in use always.

**1' All values**

LISSEN TERMINAL BLOCKS  
**1/- each**

### LISSEN disc type H.F. CHOKE

A disc-type H.F. Choke of outstanding merit, in very compact form. Will operate perfectly in any capacity reaction circuit wherever an H.F. Choke is specified. Suitable for both long and medium wavelengths. Will give perfect results in receivers employing Dual Wave Coils. PRICE



LISSEN LIMITED, WORPLE ROAD, ISLEWORTH, MIDDLESEX

# HOW TO PROTECT YOUR RECEIVER

In this article our Technical Editor deals with the safeguarding of valves and components by the use of fuses. Some little-known applications are explained

**T**HERE are several points in the average wireless set at which relatively serious damage may be done by an inadvertent wrong connection. In these circumstances it is surprising that more precautions are not taken to guard against accidents.

Any electrical supply to a building is sub-divided into circuits, each of which is protected by fuses so that the current cannot exceed the safe value.

With wireless practice the currents dealt

with are so very small that any normal type of fuse is quite out of the question. A piece of 50 S.W.G. copper wire, for example, requires over half an ampere to fuse it, whereas the normal current in a wireless receiver is of the order of 20 or 30 milliamperes only.

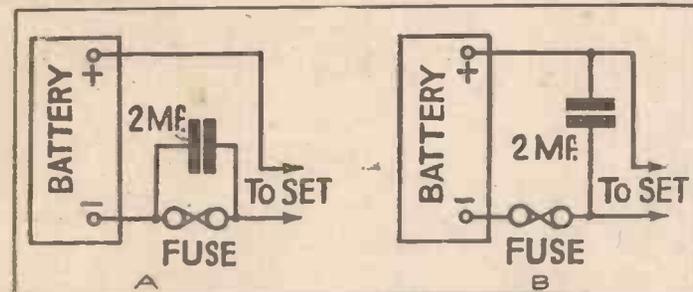


Fig. 1. Two ways of inserting a fuse in the H.T. lead

with are so very small that any normal type of fuse is quite out of the question. A piece of 50 S.W.G. copper wire, for example, requires over half an ampere to fuse it, whereas the normal current in a wireless receiver is of the order of 20 or 30 milliamperes only.

One solution of the problem has been the development of flash-lamp bulbs having very fine filaments. Such bulbs have now been made to operate on as little as 60 milliamperes and to blow at about 100 milliamperes, while more robust fuses blowing at 200, 300, and 500 milliamperes respectively are obtainable. This class of fuse is generally reliable, although it takes an appreciable fraction of a second to blow.

### Gold Film Fuses

A fuse of a different character is the gold film fuse, which consists of a very thin layer of gold mounted on a small glass strip. At normal currents this gold has an excellent conductivity, but as soon as the current rises above a certain value the gold film disintegrates and breaks the circuit. The action is extremely rapid, often taking less than one-thousandth of a second, and fuses of this type have been made to operate with as little as 5 milliamperes.

It is not proposed to enter into any discussion of the relative merits of different types of fuse, but rather to indicate the position in which fuses may conveniently be used. One of the most common applications of this form of protection is in the high-tension circuit of a receiver to prevent the H.T. battery from being connected across the filaments of the valves in the event of an accidental short circuit. Where one is carrying out experiments it is a very easy matter to make a wrong con-

nection or even to drop a screwdriver into the set and momentarily connect the H.T. + to the L.T. circuits. Normally, of course, the filaments of the valves would be burnt out by the application of this excessive voltage, but if we can arrange in the H.T. circuit a fuse which prevents the current from rising to a dangerous value, then the likelihood of damage is greatly reduced.

The ideal arrangement is to have a fuse just sufficiently large to carry the normal H.T. current of the receiver. This will blow at about twice the normal value, which is sufficient margin of safety to allow for abnormal conditions, such as a sudden rise in the anode current due to one of the valves oscillating, and yet as soon as the conditions definitely become faulty the fuse cuts out. On the other

hand, since one's principal consideration is the protection of the valve filaments, it is sufficient in many cases to have a fuse which will blow at a current of the same order as the filament current. Thus, with a three-valve set taking, say, 0.4 ampere on the filaments, a fuse which will actually blow at 200 milliamperes would provide adequate protection. Of the two methods the former is more sound, unless the fuse in the latter case is a very quick-acting one.

Small-current fuses usually have an appreciable resistance, and if such a fuse is included in the common negative lead, battery coupling may be introduced. It is desirable to shunt the fuse with a condenser of 2 microfarads or so in order to minimise battery coupling, or alternatively to shunt the condenser across the whole of the battery as shown in Fig. 1(b). The condenser should not be too large, or the current rush, due to the charging of the condenser when connecting up the circuit, will blow the fuse.

Grid-bias fuses can be arranged in the same way, for with the modern receiver having 9 to 18 volts grid bias or more, the G.B. battery is just as liable to cause trouble as the H.T. supply.

### Protecting Mains Units

When we come to mains apparatus, fusing is required for a rather different reason. Even if the H.T. supply were inadvertently connected across the filament supply the heaters could not burn out, owing to the high internal resistance of the windings. The receiving valves would, therefore, not be damaged; but the current drawn would be considerably in excess of the normal, and this would entail trouble from two causes.

In the first place, the current through

the rectifier would be excessive, and this would cause overheating in the case of a metal rectifier and loss of emission in the case of a valve. In both cases the rectifier would be damaged.

A similar effect happens if the reservoir condenser immediately following the rectifier develops a short circuit. The current again reaches an excessive value and damage to the rectifier will easily result. Both these troubles may be guarded against by the inclusion of a fuse in the H.T. negative lead as shown in Fig. 2. The arrangement is exactly similar to that of a battery set and functions in the same manner.

### Power Transformer Safety

It is becoming more the practice, however, to put fuses in the mains lead to the primary of the transformer. If the fuse is suitably chosen it will be found to give adequate protection against the faults just described, because any excessive current in the secondary draws a correspondingly large current from the primary. Protection in the mains lead has the further advantage that it guards against any short circuits that develop across any of the filament windings, or if the transformer is inadvertently connected to too high a voltage (e.g., a 100-volt transformer connected to 200-volt mains).

This fuse on the primary side, however, must be chosen with a certain amount of care. It is not sufficient to obtain a fuse rated to carry the normal current of the receiver and, therefore, blowing at twice this current. At the actual instant of switching on the current is momentarily considerably in excess of the normal. This is partly due to the fact that the heaters of the valves are cold and take a much larger current than normal, and partly

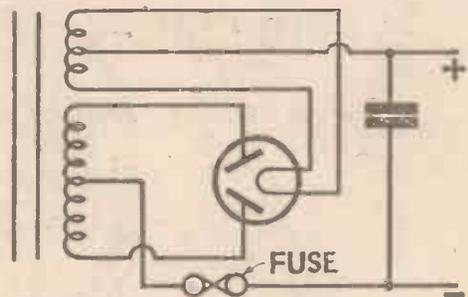


Fig. 2. Protection for a rectifier valve is often useful

due to the fact that when switching on any transformer certain transient effects can occur which tend to give double the usual current for a fraction of a second. The instantaneous current on switching on may thus be three or four times the normal, and practical tests confirm this point. The fuse in the mains lead should thus be designed to work at twice the normal current and to blow at four times the normal current. This will provide adequate protection.

# THE "1932 ETHER SEARCHER"

A SET THAT IS RIGHT UP-TO-DATE

BAND-PASS COILS

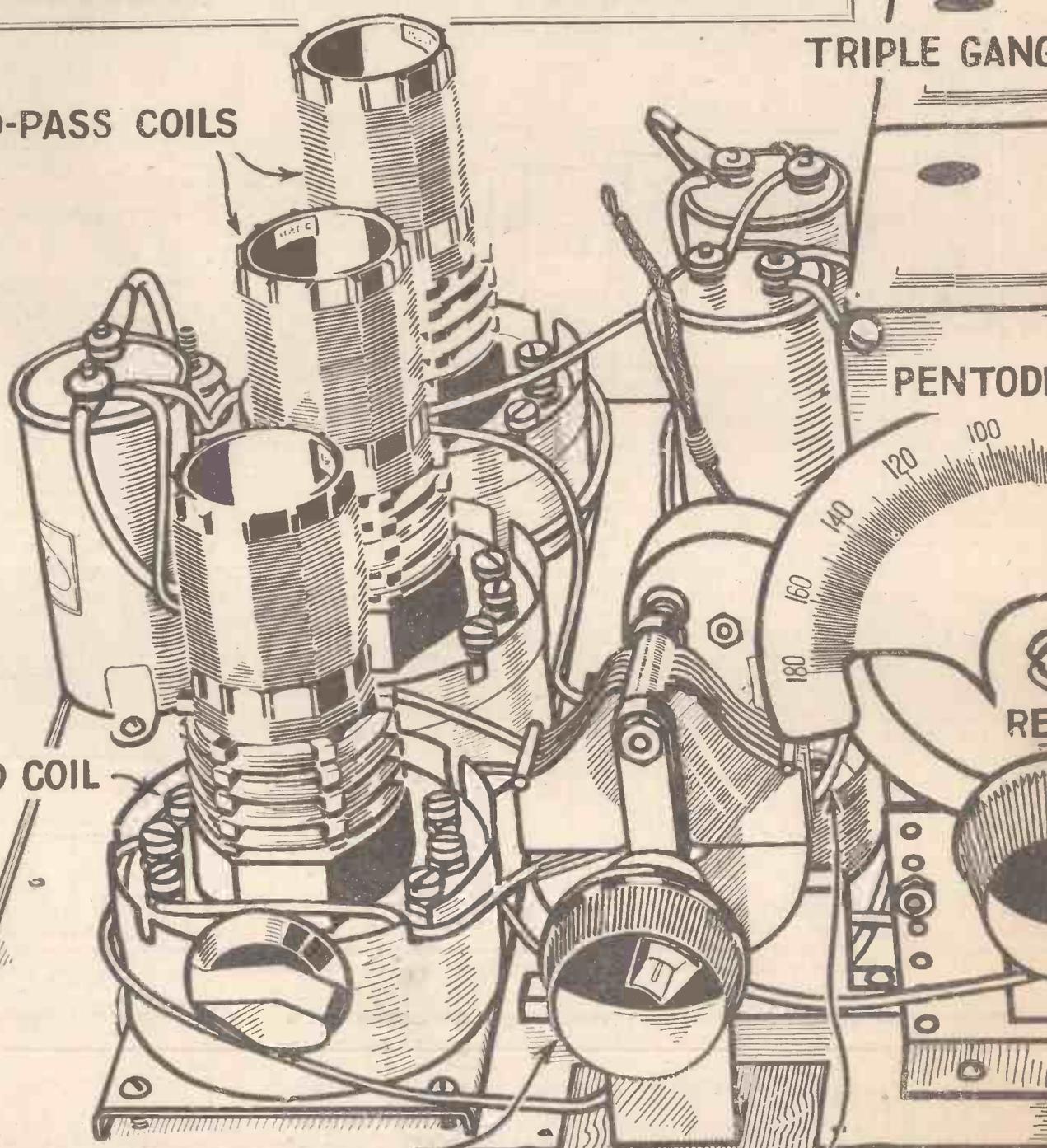
TRIPLE GANG

PENTOD

GRID COIL

SERIES AERIAL COND<sup>SR.</sup>

SCREEN-GRID VALVE HOLDER

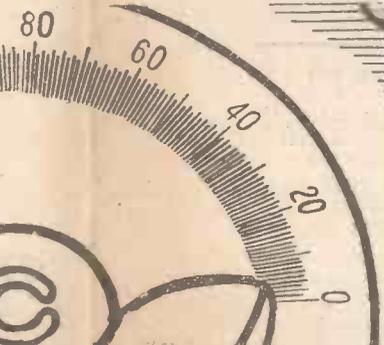


# CONSTRUCTOR'S PICTORIAL GUIDE

*Amateur Wireless, January 23, 1932*

CONDENSER

VALVE HOLDER



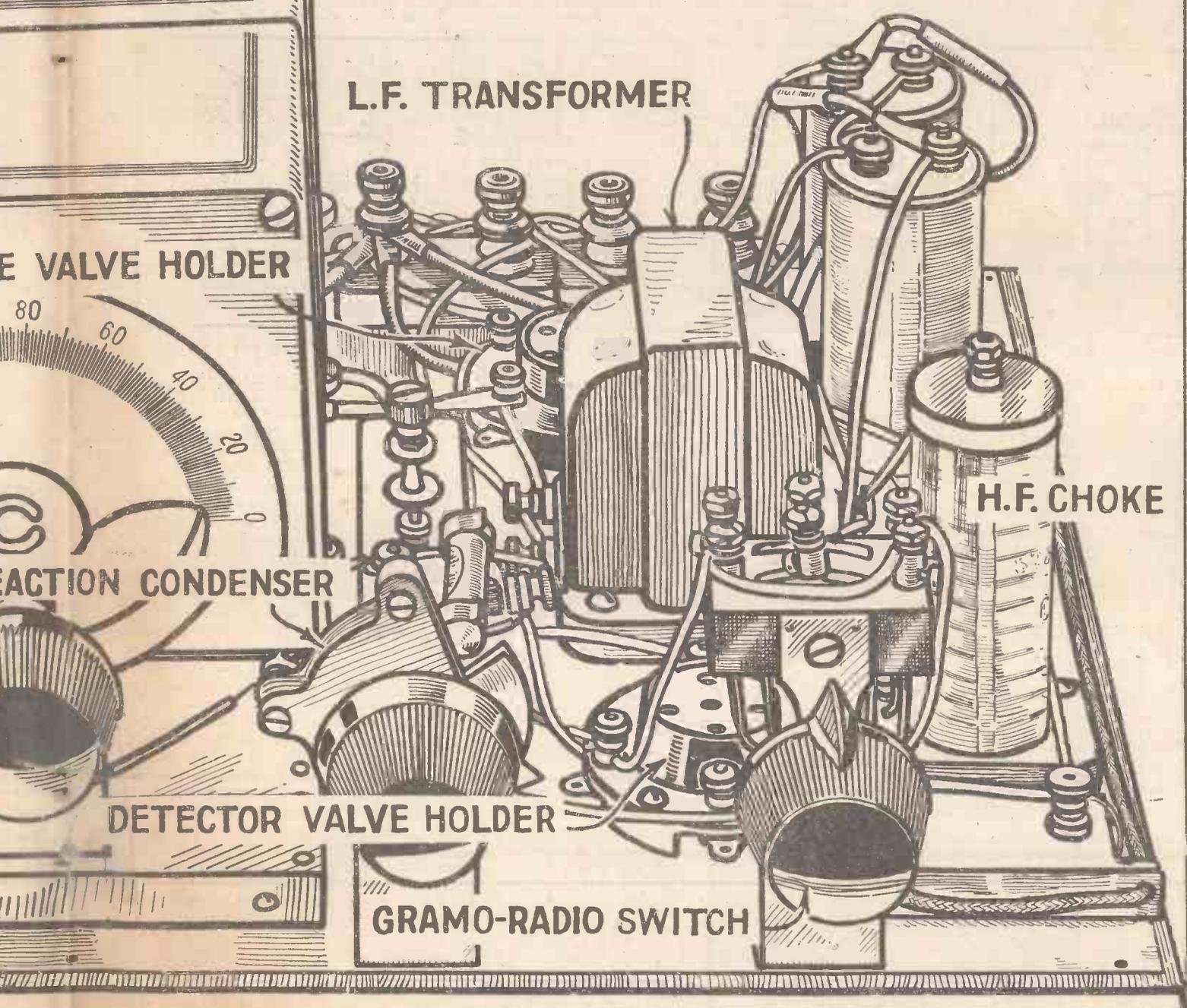
REACTION CONDENSER

L.F. TRANSFORMER

H.F. CHOKE

DETECTOR VALVE HOLDER

GRAMO-RADIO SWITCH



**Y**OU will, of course, have seen the preliminary details for the "1932 Ether Searcher," which were given on pages 100 to 102 of last week's issue of AMATEUR WIRELESS, No. 501. You must keep this copy by you because a full-size wiring plan was given with it which, with the aid of a pictorial diagram on pages 152 and 157 this week, will make the construction and operation as easy as possible.

The "1932 Ether Searcher" is an easy set to build. Taking into consideration the complications introduced by the ultra-modern circuit and the neatness of the final layout, the construction is remarkably simple.

Typifying its modern design, the new "Searcher" does away with the conventional ebonite-panel-and-right-angle-baseboard system of construction. But it does not err on the side of being too mechanical and having an all-metal construction which is above the capabilities of the novice to tackle.

### No Panel

A sufficient amount of metal has been introduced in the design of the "1932 Ether Searcher" to stabilise the circuit and effectively screen the stages. Nevertheless the set, basically, is built up on a piece of plywood and actually the only metal work which has to be undertaken is the shielding which covers the top of this plywood board.

In essentials, you see, the set is built up on a 16-in. by 10-in. plywood baseboard, covered with metal foil. The three-gang condenser is in the centre of the set and the three-coil unit is on the extreme left-hand side. The screen-grid valve and other high-frequency components are on this side too, while the detector and power valve are on the right-hand side of the condenser unit.

Another modern feature of the set is the mounting of the "panel" parts on small brackets. The set is intended to be placed in a cabinet fitted with a wooden front and the shafts of the wavechange switch, balancing condenser, tuning control, reaction condenser, and radio-gramophone switch project through. No parts are actually mounted on the wooden panel and this is a good feature, because by mounting the parts firmly on the L brackets, care can



This remarkable new set was introduced in last week's issue and a full-size constructional wiring plan was given

be taken to get good earthed connections where necessary.

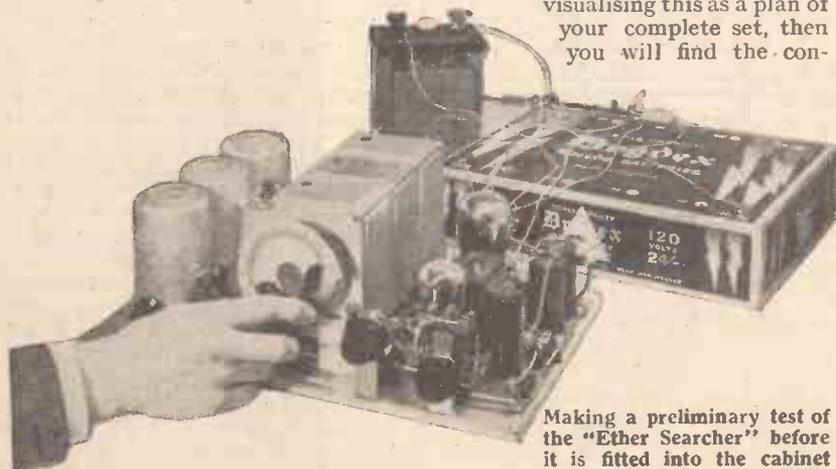
After the details given in last week's issue, you will probably have by you all the parts needed. If these are purchased complete in a kit from one of the several manufacturers making up complete groups of parts, then you will have an additional check in having selected parts of the correct electrical values. If you are buying loose parts yourself and perhaps using components from some other set, then do take the greatest care to see that every condenser and resistance is of the rated value for each particular job.

If you use the full-size wiring plan given on pages 98 and 103 of last week's issue, visualising this as a plan of your complete set, then you will find the con-

struction absurdly simple. As a first step cover the 10-in. by 16-in. seven-ply baseboard with a piece of aluminium foil measuring 15 3/4 in. by 9 3/4 in. If you have not purchased your parts in a complete kit (with which the foil will be supplied), then you must get this metal sheet from an ironmonger's.

### COMPONENTS NEEDED FOR THE

- .0005-mfd. triple gang variable condenser (J.B., type R.3; Utility, Polar, Lotus).
- Three dual-range coils mounted and ganged (Colvern, type K—pair of KBLC and one KGR).
- Baseboard, 16 in. by 10 in. (Peto-Scott).
- Piece of aluminium foil, 15 3/4 in. by 9 3/4 in. (any ironmongers).
- One five-pin valve holder (Junit, Lissen, W.B., Lotus, Bulgin, Benjamin).
- One four-pin valve holder (Junit, Lissen, W.B., Lotus, Bulgin, Benjamin).
- One four-pin valve holder (Telsen, Lissen, W.B., Lotus).
- Two .0002-mfd. fixed condensers (Lissen, Dubilier, T.C.C., Formo, Ormond).
- One .0002 fixed condenser (Dubilier type 62), T.C.C. type SP., Telsen).
- Three 1-mfd. fixed condensers (Dubilier type 9200; Formo, T.C.C., Lissen, Telsen).
- 2-mfd. fixed condenser (Dubilier, type 9200; Lissen, Formo, T.C.C.).
- High-frequency choke (Lissen "D.sc," Varley, Polar, Atlas, Climax, Telsen, Watmel).
- High-frequency choke (Readi-Rad, Lissen, R.I., Climax, Wearite, Telsen, Atlas, Watmel).
- Low-frequency transformer (Lissen "Hypernik," Telsen Radio-grand, 7 to 1 R.I., Lotus, Igranic, Ferranti, Varley, Lewcos).
- .0002-mfd. reaction-type variable condenser (Formo "Midget" with knob, Lissen, J.B., Polar, Lotus, Telsen, Ormond).
- .0003-mfd. reaction condenser (Readi-Rad, Lissen, J.B., Formo, Polar, Lotus, Telsen, Ormond).
- Double-pole change-over switch (Wearite, type I.22), with terminals



Making a preliminary test of the "Ether Searcher" before it is fitted into the cabinet



Do not make the mistake of getting very thick foil, because it will only make it difficult to mount the baseboard parts with ordinary wood screws. The foil need be no thicker than the paper on which this is printed and metal of this gauge can easily be tacked down to the baseboard with small nails. Get it quite flat, so that it does

**FORTY STATIONS IN 90**

# ETHER SEARCHER



not bend upwards and make "bubbles" in parts. Mounting the baseboard parts will help to keep it down on the board.

There is just one little point which it is advisable to attend to now, as it may be overlooked if left to a later stage in the construction. The bracket on which the

diagram will show you the correct position. In fact, when you have tacked the foil down to the baseboard, you can plot the positions of all the baseboard parts.

Detach pages 100 to 102 complete from your copy of AMATEUR WIRELESS, No. 501, exposing the wiring plan as a complete sheet. This can then be pulled away from the wire fasteners and can be placed down on the baseboard.

The brackets for the three-gang condenser should be mounted and, in fact, this condenser temporarily can be put in place, to show you just where the other parts come on the baseboard and to enable you better to

visualise the complete set. Prick through the screw holes for the brackets and screw these down.

Even if the condenser is temporarily mounted, remove it from its brackets before continuing mounting the other parts, because if the condenser is left in position it will make it difficult to get the proper positions for the small parts near it. The three-gang condenser should be actually one of the last components connected when you come to the wiring stage.

## Assembly

Put out the complete kit of parts on the table before you and, using the wiring plan as a guide, prick through the screw holes for each component. Make sure that you get the condensers in their right positions. The grid condenser, for instance, stands upright, while the detector by-pass condenser is flat on its side. Mount the valve holders, condensers, terminal blocks, and then the three-coil unit at the extreme left of the set. Instructions are given with the coil unit for mounting. As the three coils are rigidly fixed to the aluminium strip forming the base, it is necessary only to screw this firmly down to the metal foil on the baseboard. The alignment of the coils and of the wavechange rod does not concern the set builder.

Now you can mount the balancing and reaction condensers and radio-gramophone switch on the three L-shaped brackets. These brackets are supplied with most kits of parts, but otherwise must be bought separately or cut from scrap aluminium. The dimensions are not critical and the only point to observe is that the knobs of these parts present a symmetrical appearance and that the moving vanes of the balancing and reaction condensers do not foul the main tuning condenser as they are rotated.

Also you must note that the reaction condenser must be mounted firmly on the bracket, for otherwise if it is pushed forward

## THE "1932 ETHER SEARCHER"

- and indicating window "Radio-off-Gramo.')
- Pre-set condenser, .0002 mfd. to .001 mfd. (Sovereign, type G; Lissen, Ormond, Telsen, Formo, R.I., Igranic, Polar).
- .05-mfd. fixed condenser (non-inductive) (Dubilier, type 9200; T.C.C.).
- Valve screen (Colvern).
- Five spaghetti resistances, one 50,000 ohm, one 10,000 ohm, two 5,000 ohm, and one 1,000 ohm (Lewcos, Lissen, Bulgin, Varley, Telsen, Readi-Rad, Sovereign).
- 3-megohm grid leak (Lissen, Telsen, Dubilier, Sovereign, Grabam-Farish).
- Fuse holder and fuse (Bulgin, Lissen, Telsen, Readi-Rad).
- Three terminal blocks (Lissen, Belling-Lee).
- Three yards of thin flex (Lewcoflex).
- Connecting wire and sleeving (Lewcos, "Jiffifix").
- Three aluminium brackets to specification (Readi-Rad, Peto-Scott).
- Two spade terminals, marked L.T.-, L.T.+ (Belling-Lee, Clix, Eelex).
- Six wander plugs, marked H.T.-, H.T.+1, H.T.+2, G.B.+ , G.B.-1, G.B.-2 (Belling-Lee, Clix, Eelex).
- Two-foot length of shielded wire (Lewcos).
- Cabinet (Peto-Scott).
- Speaker (W.B., Type PM3 with cabinet).
- 120-volt double capacity H.T. battery (Drydex, Lissen, Pertrix, Fuller, Ever Ready).
- 2-volt accumulator (C.A.V., Exide type D, Pertrix, Fuller).
- 16-volt G.B. battery (Drydex green triangle, Lissen, Pertrix, Fuller, Ever Ready).

balancing condenser (second knob from the left) is mounted must not touch the foil, whereas the other two brackets are mounted on top of the foil, making electrical contact with it.

So, before you forget it, cut away a small part of the foil where the balancing condenser bracket will be mounted. The wiring



## MINUTES IN FIRST TEST



A close-up of the H.F. end of the set showing the coils

“BUILDING THE ‘1932 ETHER SEARCHER’” (Continued from preceding page)

at all while the knob is rotated, one of the terminals at the back will foul the bracket of the gang condenser.

There are several other little constructional points which must be noted, but on the whole the construction is simple and obvious from the wiring plan and photographs. The holder for the screen-grid valve is mounted on the top of the base of the aluminium can which covers the whole valve. Slots are already cut in this base so

RECOMMENDED VALVES			
Make	S.G.	Detector	Power
Mullard ...	PM12	PM1HL	PM22
Marconi ...	S22	HL2	PT2
Osram ...	S22	HL2	PT2
Mazda ...	SG215	HL210	Pen220A
Cossor ...	215SG	210HF	230PT
Six-Sixty ...	215SG	210H	230PP
Lissen.....	SG215	HL210	PT225
Eta.....	BY6	BY2023	—
Fotos.....	BC150	BC18	BD100
Dario.....	SG	HF	—
Tungsum	S210	H210	PP230

that the four leads may pass out from the holder. Do not be confused if your particular base has five slots. Only four of them need be used.

As you have already cut away the foil to clear the base of the bracket holding the balancing condenser, make sure that there is no possible electrical connection between the bracket and the metal work. There is no danger attached to a short circuit here,

with bare tinned copper wire, which must be put inside insulated sleeving. We have used Jiffilix in wiring the original set, and this system has much to recommend it.

The wires are shown as black lines on the wiring diagram. In each case the wire should be cut about half an inch longer than actually is needed to go easily from point to point, so that loops may be made at each end to clamp on to the terminal heads. The insulated sleeving is cut a trifle shorter than this and is slipped on the wire before the final end loop is made.

The wires shown with no shading at all on the wiring diagram are flex leads and in most cases these go straight out to the battery connection points. A wander plug or spade tag should be put on the end of each wire and the wiring diagram clearly shows which are the high-tension, low-tension, and grid-bias leads. The following are the flex leads: 6, 7, 25, 27, 28, 31, 51.

The wires shown with black and white shading are not leads, but spaghetti resistances. The values are shown against each, and take care that you get these in the right positions.

Where wires are shown dotted it indicates that they pass underneath or through any special component. For example, three wires and a spaghetti resistance pass underneath the three-gang condenser, and where the wires enter the shields of the three tuning coils they are shown dotted.

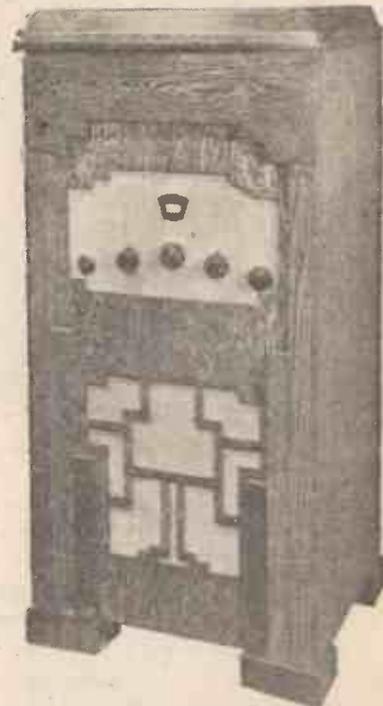
Each coil has six terminals and it is, of course, of the greatest importance to connect these up in the right way and see that no loose ends or soldering tags touch the screen bases of the coil.

There are two special leads which come under the heading neither of flexes, insulated sleeving, nor spaghetti resistances. These are the leads from the radio-gramophone switch to the terminal block for the pick-up at the back of the baseboard and the lead from the high-frequency choke to the anode of the screen-grid valve. These leads are made of special shielded wire, detailed in the components list, and a 2-ft. length will be ample for both leads.

The lead from the radio-gramophone switch is connected between the two terminal points and earthed by clamps—ordinary staples—to the metal foil. There is an interesting feature in connection with the anode lead to the top terminal of the screen-grid valve. The bare end of a short length of flex is twisted around the outer covering of this anode lead and a good electrical connection must be made. The other end is earthed under one terminal of

the 1-microfarad condenser, next to the H.F. choke. This detail is clearly shown in the wiring diagram and the lead referred to is wire 30. It should be noted that the radio-gram switch does not cut out the screen-grid valve when in the gramophone position.

At certain points of the set connections are made direct to earth by means of an inch or so of the bare tinned copper wire,



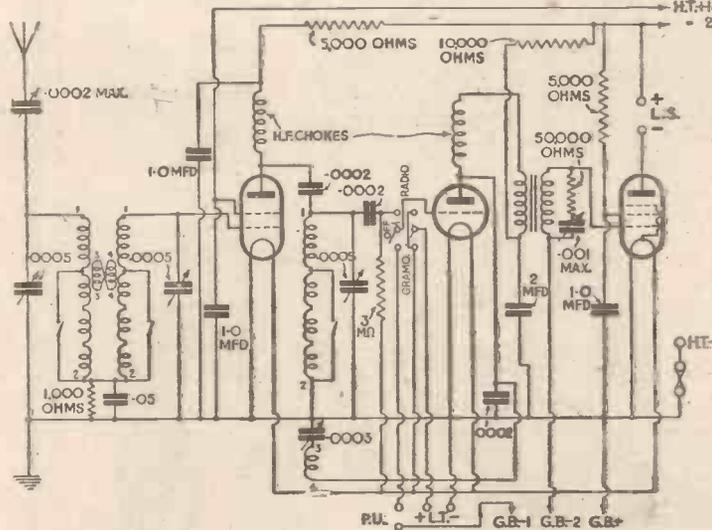
The 'Ether Searcher' makes an ideal radio-gramophone. This is the special Clarion cabinet designed for those who wish to make it up in this form. Full details of the assembly will be given in a later issue

connected to a terminal on the component and then clamped underneath one of the fixing screws, so that the wire touches the foil. By the way, when operating the set remember that this foil is at earth and negative high- and low-tension potential, so do not get bare high-tension positive connections in contact.

When all the leads have been put in place, make a careful check of the whole of the wiring, for this will save a lot of trouble and may even save damaging valves. Next week's issue will contain operating instructions and test reports of the completed set. These are of the greatest value to "Searcher" constructors. Although the operation itself is easy, the preliminary tuning up and ganging of the set must be done with care.

The West Regional station will broadcast speeches and music from the annual gathering of the Cardiff Caledonian Society in celebration of Burns Night on January 25.

**NEXT WEEK:  
FULL OPERATING NOTES  
AND TEST REPORT**



The circuit of the "1932 Ether Searcher." A full-size layout and wiring diagram was given in last week's issue

but as the aerial will be "shorted" to earth, you will get no results.

**Wiring**

At this stage you should have the set bearing a close resemblance to the photographs, but without the three-gang condenser. Now we are ready for wiring—a simple job in the case of the new "Searcher" and not one of which even the new constructor need be afraid, for fear of getting in a muddle.

The ordinary wiring of the set is done



# OUR BROADCAST CRITIC

## TALKS ABOUT—A GOOD SHOW

I IMAGINE most of you listened to *Good Night, Vienna!* "A romantic operetta for broadcasting" was the description given of it in the programme—a description that exactly suited it.

I am all in favour of this type of entertainment. For one thing, it was devoid of the eternal American style of music and text generally, for which I, for my part, was thankful. We have had far too much of that sort of thing lately.

I should like to congratulate Mr. Holt Marvell on writing for the microphone; he contrived to create a thoroughly Viennese atmosphere and to make his libretto intelligible at the same time.

Light entertainments with a strong atmosphere about them are wanted increasingly, especially when set to music of the kind George Posford writes.

Apart from the excellence of the actual writing, I thought the production well thought out and the soloists splendid all through.

Turning to more serious thoughts, I thoroughly enjoyed the Sunday evening broadcast of Bantock's *Song of Songs*. I thought the music very lovely, especially the canonic setting of the twenty-third Psalm.

Frank Titterton sang magnificently; I have rarely heard him better, while Elsie Suddaby and Norman Allin, as the Shulamite and King respectively, were most impressive. Altogether, I consider the broadcast one of the best for a long time.

In the afternoon I was very pleased with the Lane Wilson programme. It is a long time since I heard any of his music, which came back to me with such a singular freshness. The singers, Megan Thomas, Esther Coleman, Herbert Thorpe, and Foster Richardson, sang effectively throughout.

The *Cupid—Plus Two* vaudeville was not very entertaining; I certainly think it was not worth doing twice in one week. Bobbie Comber was amusing, but the rest rather bored me, the syncopated piano-playing, in particular. I thought it bad technically; I hate to hear a piano thumped.

The chamber-music concert that same evening left me disappointed. The Michael Dore Trio might have impressed me had they played something more attractive than the work by Ravel.

It was, to me, very ungrateful sort of stuff. Usually I like Ravel because he is not hyper-modern; here I found him hyper-

tuneless and disagreeable harmonically.

Sophie Wyss, singing Debussy in the same programme, cheered me up a little; her French was, however, not quite good enough. Still, it was a degree better than the announcer's!

I wonder what you thought of *Winter Landscape*? I heard part of it and came to the conclusion that its style would appeal to a minority. After all, there are minorities, and it is nice to please them occasionally. Not everyone wants vaudevilles or dance bands.

There was quite a good soprano singing in a light music programme on the Tuesday evening—Rosalind Rowsell. A very good voice; but why did someone allow her to "blast" on her high notes? It was not her fault. I do think the utmost care should be exercised with regard to these vocal transmissions; this is not the only one that has been spoilt by carelessness in control.

I enjoyed the playing by Section D of the B.B.C. Orchestra of Mendelssohn's "Ruy Blas." Landon Ronald is always credited with enjoying the music he conducts. In this instance he enjoyed some of it so much that he lingered too long over it; his tempo was incorrect in places.

I thought Leslie England played the

Saint-Saëns Concerto admirably. It was not his fault that the lower notes of the piano were out of tune; has the B.B.C. no tuner?

Thinking of these operatic broadcasts, such as *Good Night, Vienna*, I plead for more of them. I am convinced they are acceptable. To my way of thinking, the excerpts from *The Daughter of the Regiment* made an ideal entertainment. The music, of course, was altogether delightful; apart from which the whole atmosphere of the work was eminently suitable to the microphone. It needed no effort of imagination on the listener's part to absorb the plot. The singing, I thought, was well up to standard.

Vernon Bartlett was very interesting on foreign affairs on Thursday evening. I switched him on accidentally, as a matter of fact, but he held me until the end. He is amongst our best serious broadcasters.

Then followed a singer who won my mental thanks for singing dead in tune. I have heard so much out-of-tune singing broadcast recently that I cannot refrain from mentioning Dale Smith, of whom I hope to hear a great deal more. His voice is thoroughly suitable to the microphone, his diction is practically perfect, and (as I have said) he sings dead in tune.

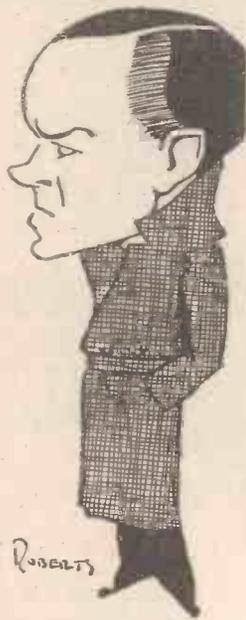
The music of Stanford and Parry made a pleasant combination and a pleasant contrast at the same time. Winifred Small's playing of the violin works of the latter composer was, I thought, extremely good.

There was a diverting vaudeville on Friday evening. Marcelaine D'Alroy's monologues were delightfully quaint and original. Monologues are often unsatisfactory, but these were quite the reverse.

The other item I enjoyed was a very good type of melodrama called *The Duster*.

It is not at all a bad idea to introduce a "thriller" occasionally into a vaudeville programme. In this instance one recognised the power of Philip Wade's writing. It left me wondering whether the piece was written for the microphone or whether it was adapted. It may have been stated either one way or the other, but if so I must have missed it.

I think I should add a word of appreciation of the clear diction of the actors; every word was almost strangely clear, which, of course, simply added to the thrill of the piece. WHITAKER-WILSON



An impression of Colin Clive

## THE HOW AND WHY OF TUNING—XIX

# ALL ABOUT THE HARTLEY CIRCUIT

In this, the nineteenth article in a complete series on tuning, Hotspot explains the Hartley circuit, and shows how a simple centre-tapped coil can be used to make a very selective aerial-tuning circuit on the Hartley system

WHEN seeking ways and means of making the aerial tuning circuit more selective you should not overlook the claims of the simple Hartley system, which is most easily understood by a study of the five circuits A, B, C, D, and E shown by Fig. 1.

amplifier, we must connect one end of the tuning coil to the grid and the other end to low-tension negative.

Close examination of the B circuit will show you that the current flowing in the aerial circuit takes in only one-half of the centre-tapped tuning coil, namely, the

coil forming the grid and low-tension negative connections respectively.

So far as the aerial-to-earth and grid-to-filament damping effects are concerned, the C and D circuits are equally good. But there is an important advantage of D over C. With the D circuit we have a "free"

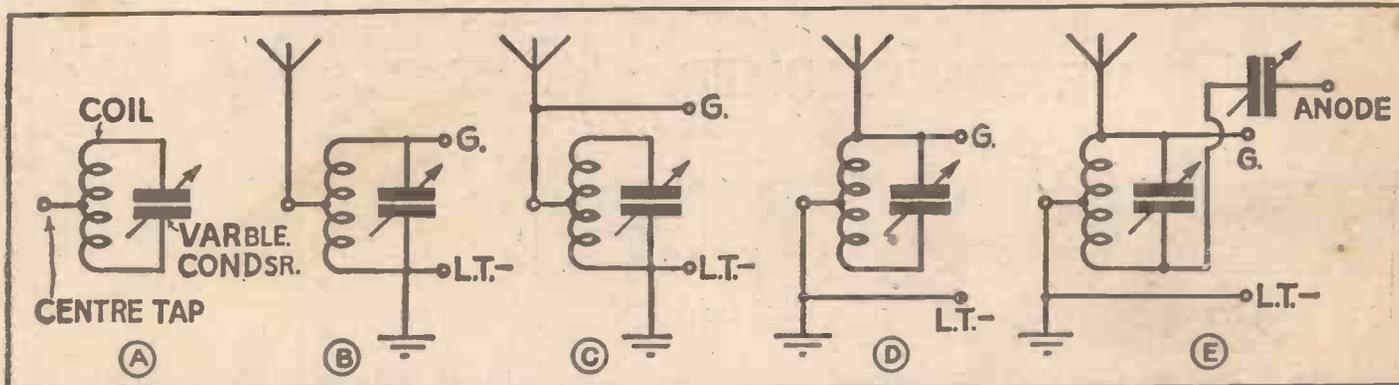


Fig. 1. These five circuit diagrams show how the Hartley arrangement at E was evolved from a centre-tapped coil

At A we see a centre-tapped coil, which can be either a solenoid winding or a plug-in coil, tuned by a variable condenser, having the usual value of .0005 microfarad. We are concerned at the moment with the various ways of making use of three connecting points, namely, the centre tap and the two ends of the coil and condenser.

On turning to B you will see one way. Here the aerial lead is taken to the centre tap of the coil. And as there will be a valve immediately after the tuning circuit, either the detector or a high-frequency

lower half. This method of connection is really an auto-transformer, with the lower half of the coil acting as the primary and the whole coil as the secondary.

As the advantages of this method have already been fully discussed in this series, I will pass on to C. As in the B circuit, the aerial is taken to the centre tap of the tuning coil. But so also is the grid of the valve, so that the grid circuit is across only one-half of the coil, namely, the lower half. Note, though, that the variable condenser still tunes the whole coil.

This C circuit repays a further look-over since it is a circuit capable of giving very selective tuning. Not only is the aerial damping reduced by removing the source of damping from the whole coil to one half, but so is the detector damping.

Now look at D, and you will see that the aerial and detector damping are also cut down, only in this D circuit it is the top half of the tuning coil that serves. We still have the centre tap and we still tune the whole coil. Here the aerial lead has to be taken to the top of the coil and the earth to the centre tap, these two connections of the

end of the tuning coil, namely, the end of the coil remote from the aerial and grid. This coil end can be used for reaction, by connecting a variable condenser between the coil end and the anode of the valve whose grid is connected to the other end.

At E you can see how this addition is made. And there you have the Hartley reaction system; which is very simple to understand when built up from the preceding circuits, is it not? The advantage of the Hartley system is obvious; with the simplest of coils, namely, a centre-tapped coil, we are provided with selective tuning and simple reaction.

Perhaps it would be as well to mention the disadvantages, chief of which is that neither side of the reaction condenser can be connected to earth, and so there is a possibility of erratic reaction control. Another disadvantage is that switching from medium to long waves involves a certain complication. This will not affect the user of plug-in coils, nor the user of a set wanted only for medium-wave tuning.

As a guide, I recommend a No. 60 centre-tapped coil of the plug-in type. This will cover the medium waves. A No. 250 coil will be needed for the long waves. It should be remembered when choosing coils for the Hartley circuit that the aerial and earth are across only half of the coil, meaning that the capacity is reduced, so entailing more turns than would be needed with the whole of the aerial capacity across the coil.

As both aerial-to-earth and grid-to-filament damping are low with the Hartley (Continued at foot of page 160)

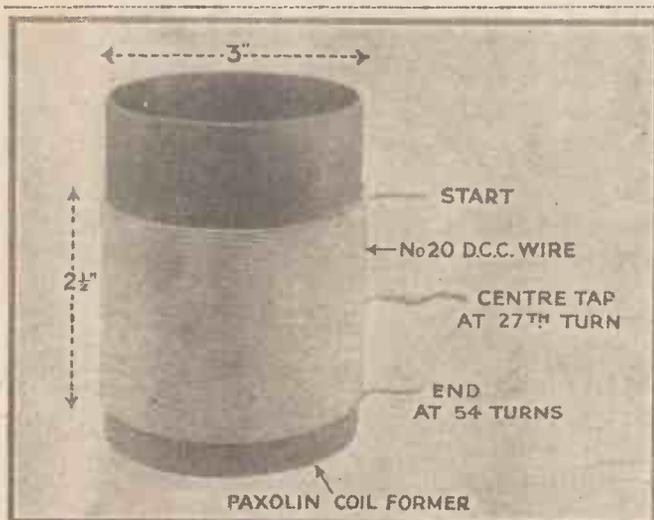


Fig. 2. Winding details of a medium-wave centre-tapped solenoid coil suitable for use in a Hartley circuit

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# IN MY WIRELESS DEN

Weekly Hints — THEORETICAL  
CONSTRUCTIONAL & BY  
**W. JAMES**

### Designing Your Own

There are so many simple sets available just now for the amateurs to build that it might be thought an easy matter to design such a set.

It does not do, however, to get the necessary parts, to screw them down, and to wire them without taking trouble. The careful man will always get better results.

There is a best place for the various parts and the wiring is quite important. Then again, some parts work best with others having certain characteristics. All the parts must be chosen to form a complete set, having desirable properties. For example, if the tuning coils tune rather sharply, so tending to cut off the higher notes, the low-frequency parts should have a rising characteristic in order that the tendency in this part of the circuit shall be to strengthen the treble.

When a pentode is used without a high-note filter the high-note losses in a circuit can be considerable before the quality is spoilt. The results obtained depend upon all parts and it is foolish to choose parts that, taken by themselves, are good, as it is the output from the loud-speaker that counts.

### Battery-type Multi-mu's

I see that Cossors are now producing a battery model multi-mu screen-grid valve.

This is to have a slope of 1.6 milliamperes per volt at zero bias, that is, with the grid return circuit taken to the negative side of the filament.

When valves are available we shall see how the characteristics vary with the grid bias. This type of valve is, of course, intended to be used with a variable bias as volume control. There are numerous advantages which have been explained.

The control of volume with negligible effect upon tuning and quality has been considered since broadcasting began, as we have always had to face the great strength of the local station. Most controls used in the past have introduced difficulties, but the chances are that, with the new multi-mu valve, we shall obtain good results.

### Strong Ganged Condensers, Please

Ganged tuning condensers ought to be so strongly made that the accuracy of the separate condensers at all points is not affected by the process of fixing the condenser.

I have noticed, however, that some types are not so well made that when the fixing screws are tightened the capacity of the sections is not affected. In one or two cases the accuracy of the matching has definitely been upset when the condenser has been fastened down.

With a stiff framework this does not occur, but as some types are not very stoutly made care must be taken not to fasten the fixing screws too tightly.

### Trying a New Detector

Some of the more efficient detector valves are fair examples of the valve makers' skill in working with small clearances between the electrodes. But you should not necessarily expect that the signals will be increased in strength when one of these new valves is fitted in place of an older type.

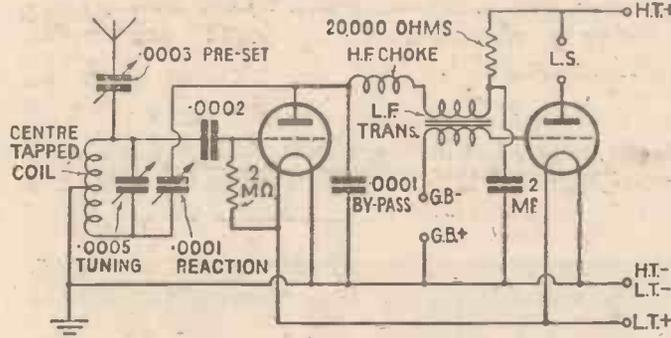
When receiving the local stations, for example, the results may not be quite as good. This is because the valve is being overloaded. If a volume control for reducing the strength of signals applied to the detector is fitted to the set, this effect may not be noticed. As the valve gives an output enough fully to load the power valve with a much smaller input than would be required with a less efficient type, it is clear that overloading must be guarded against.

I have had several instances of this lately and stronger signals have, in fact, been obtained when a less efficient valve has been fitted, the set having no volume control apart from reaction. The efficient valve is, of course, of value when dealing with weak signals. The great sensitivity is then of considerable value.

## "ALL ABOUT THE HARTLEY CIRCUIT"

(Continued from page 158)

system it is also worth making the coil low



A typical two-valve circuit, comprising a detector and one low-frequency stage, using the Hartley coil shown by Fig. 2

loss. A solenoid coil will give excellent results with the Hartley circuit. Fig. 2 shows a simple centre-tapped coil I have made up for inclusion in this series.

It comprises 54 turns of No. 20 DCC wire

on a 3-in. diameter paxolin coil former. The length of the winding is just under 2 1/2 in., so a piece of not less than 3 1/2 in. will be needed to allow sufficient at each end for fixing. The tap is made at the 27th turn by twisting the wire back on itself and subsequently baring 1/2-in. or so for connection.

Fig. 3 shows a typical two-valve circuit in which the coil of Fig. 2 was actually tested out. It comprises a leaky-grid detector with a stage of transformer-coupled low-frequency amplification after it.

The circuit has given very satisfactory selectivity in the London area, enabling London Regional to be cut out and Strasbourg to be received at bud-speaker strength clear of local interference.

All the necessary values are given exactly as used in the tests. It will be seen that

a pre-set type of condenser is inserted between the aerial lead and the top of the coil, but if the aerial is on the short side this will not be needed, as the tapped coil then provides good selectivity with a direct aerial connection.

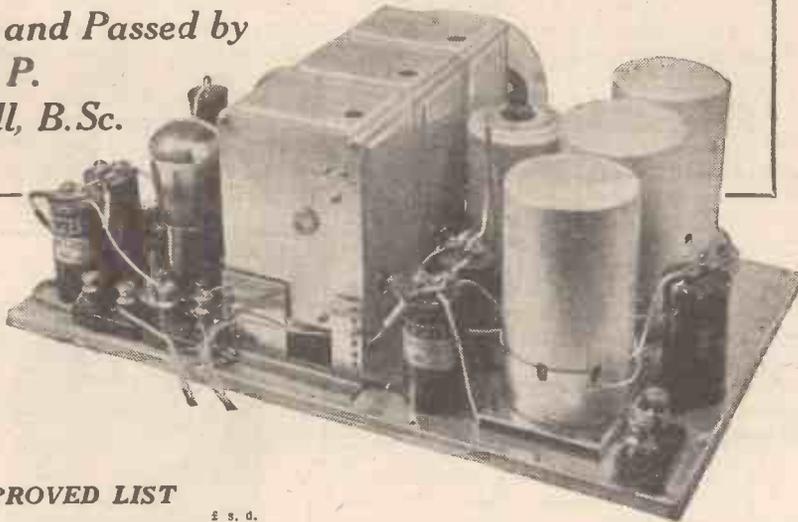
As the damping on the coil is very low, only a small amount of reaction is needed; and as half the coil is being used as a reaction coil it follows that only a small reaction condenser is required. Tests show that a .0001-microfarad maximum capacity is ample for reaction over the whole tuning range. There is an advantage in using an air dielectric type of condenser for reaction, as this type enables a more critical application of reaction to be gained, and without much trouble from hand-capacity effects.

The rest of the Fig. 3 circuit follows standard practice; I would stress the importance of the anode by-pass condenser and of the decoupling resistance and condenser, as these make just the difference between mediocre results and the really good results the circuit is capable of giving. Wind the coil and try out the Hartley circuit—you will be very agreeably surprised at the results, I am sure. **HOTSPOT.**

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2 Lewcos 5,000-ohm spaghetti resistance		2	0
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1 Valve holder		6	
1 T.C.C. .0001 mfd. fixed condenser, Type 34	1	6	
1 T.C.C. .0002 mfd. fixed condenser, Type 34	1	6	
1 Readirad 4-meg. leak and holder	1	4	
1 J.B. neutralising condenser	3	6	
1 Set of Stratton short wave coils and holder (Duplex)	1	2	6
1 Belling-Lee terminal mount		8	
2 Belling-Lee terminals		6	
1 Bulgin 4-pin bakelite plug, P.9		2	0
1 Packet of Jiffilux for wiring		2	6
1 Valve as specified (Cossor, 210 Det.)	8	6	
Flex, screws, etc.			8

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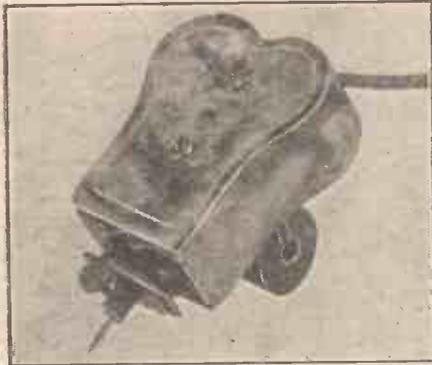
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A weekly review of new components and tests of apparatus conducted by J. H. Reyner, B.Sc., A.M.I.E.E.

#### Wates Star Pick-up

THE Wates Star pick-up on which we are reporting this week is a neatly made instrument of conventional appearance, being something like a cardoid in shape. The movement appears to be of the balanced-armature type, although the bottom air gap is unusually large. The two pole pieces are U shaped, having one side longer than the other, and mounted between the poles of the permanent magnet, so that



Wates Star pick-up for mounting on a standard pick-up arm

the two long sides and the two short sides face one another, thus forming two air gaps, a small one at the top and a larger one at the bottom.

The armature is constructed from a small piece of iron tube, this being mounted on a non-magnetic needle carrier. A rubber buffer is employed and adjustment is carried out by means of two small screws situated at the bottom of the pick-up. These two small screws also hold the armature in position on the bronze body, this also carrying the means for mounting the pick-up on the arm. The armature passes up between the two pole pieces and through the centre of the coil, the free end being vibrated by the needle in the small upper gap.

On test the pick-up was found to have a fairly even response curve from 150 to about 2,500 cycles; the output was of the order 0.1 of a volt maximum. Fair speaker strength was obtained with a two-valve amplifier. The pick-up is supplied complete with 6 ft. of connecting flex.

#### Novel Bulgin "Pot" Switch

A VERY interesting component which we have recently received for test is the combined potentiometer and on-off switch manufactured by Messrs. A. F. Bulgin & Co., Ltd. This component consists simply of an ordinary wire-wound

potentiometer on the back of which is mounted a quick-acting switch, this being operated by a small lever attached to the moving arm of the potentiometer. This small arm is so positioned that the switch is operated just as the potentiometer arm reaches the end of its movement.

The potentiometer is of conventional design, the resistance elements being wire wound and protected by some transparent material. The moving contact does not actually touch the resistance element, but pushes down on to it a thin brass plate, which is normally held away from the wire by its own springiness. By this means the resistance element is well protected and the potentiometer should give long and satisfactory service.

The switch is of the quick-action type and rated to break 3 amperes at 250 volts. A moulded bakelite body is employed and is finished in the familiar Bulgin mottled green colour. One-hole fixing is employed.

Various uses will suggest themselves to the reader, the net result being the saving of a control knob. The device retails at 7s. 6d. and is an attractive proposition.

#### Sangamo Electric Clock

READERS will be familiar with the synchronous type of gramophone motor which made its appearance some time ago. The feature of this type of mechanism is that once it is set in motion it always rotates at a constant speed, determined only by the frequency of the supply and not by the voltage.

The latest development of this principle is the synchronous clock. By arranging a similar, although a much lighter mechanism, which, once started, will revolve in unison with the frequency of the supply, we can easily arrange to drive the hands of a clock and, provided the frequency remains constant, the time indicated by the hands will always be correct.

Until recently a variation of  $2\frac{1}{2}$  per cent. was permitted in the frequency of generating stations, but with the extensive inter-linking of various stations and areas which is now taking place, a much closer tolerance than this is necessary. A large number of supplies now have their frequency controlled by a master regulator, so that the variation is negligible, and a clock run from the mains is a thoroughly practicable article.

The Ediswan Sangamo clock illustrated herewith is a typical example of such a device. The mechanism occupies about as

much space as a dash-board clock on a motor car. The primary moving part is a small rotating armature, which is magnetised. This rotates past a series of small magnetic pole pieces, the polarity of which is continually changing according to the current flowing at the time.

With an alternating supply one pole piece exhibits a north polarity at one instant and a fraction of a second later the next pole piece takes over the north polarity and



Of particular interest to set-users, the Sangamo synchronous electric clock

so on, so that the polarity travels round the assembly, dragging with it the small magnetised armature. This in turn drives the clock through the usual train of gear wheels.

The whole apparatus is housed in cases of varying size and appearance. That illustrated is a simple bakelite case in walnut finish. It is 6 in. wide, 6 in. high, and  $2\frac{3}{4}$  in. from back to front. The clock face is of standard appearance, while there is a small centre disc, with an arrow which rotates at the rate of 1 revolution per minute, and thus indicates the seconds.

To operate the instrument it is merely connected to the supply and a small lever at the back lifted and released. This sets the armature spinning at approximately the correct speed after which it pulls into synchronism with the supply and continues to rotate indefinitely as long as the supply is connected. A regulator is provided at the back for moving the hands to the correct time when the instrument is first put into commission.

We have had this instrument running for some time and it is really very useful to have a clock which never requires winding and can always be relied upon to indicate the correct time. It is quite silent in action and may be obtained at prices ranging from 45s. to £7 10s., according to the type of housing required.

NEXT WEEK: A "TWO" FOR 25/-

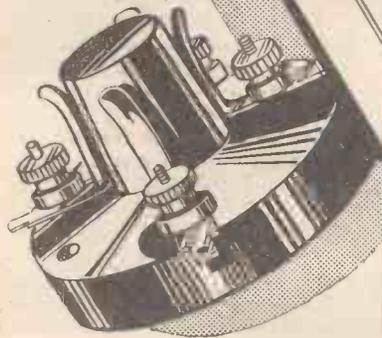
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# SHORT WAVE WORK YOU NEED LISSEN



Going to build a short-wave set? Remember you haven't got the same margin to play with as when you're building a broadcast waveband receiver. You need matched parts, balanced parts; use Lissen parts throughout, because they are made to pull together. You're going to deal with smaller signals, weaker power, and the high electrical efficiency and mechanical precision of all Lissen components will help you to conserve and utilise the tiniest distant impulse.

**ONLY BY USING THE SPECIFIED LISSEN COMPONENTS CAN YOU GET THE SHORT-WAVE RESULTS DESCRIBED IN THIS ISSUE OF "AMATEUR WIRELESS"**



The **LISSEN**  
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## IDEAL FOR SHORT WAVES

This Lissen Economy Valve Holder is particularly suitable for short waves, because there is no superfluous insulating material and, therefore, it is a low-loss and low-capacity valve holder and conserves signal strength.

Simple and robust design, with firm and individual contact between springs and valve legs.

Price, each

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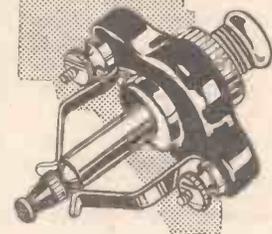
The **LISSEN**  
**SHORT WAVE H.F. CHOKE**

### LISSEN H.F. CHOKE For Short Waves

Designed specially for ultra-short wave work and can be used in any part of the circuit—reaction, H.F. by-pass and output lead filters. May also be used in normal receivers for preventing feedback and resonance in H.F. amplifiers. Short moulded case hermetically sealed.

Price

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## LISSEN SWITCHES

These Switches are carefully designed to ensure low loss and are, therefore, particularly suitable for short-wave work. They have "scraping" contacts, which are, therefore, self-cleaning. Being fitted with terminals there is no risk of loosened contacts.

Lissen Filament Switch

3-point Wave-change Switch, 1/6

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## SETS OF DISTINCTION

# H.M.V. MODEL 531 RADIO-GRAMOPHONE

Makers: The Gramophone Company, Ltd.

Price: 70 guineas

**I**N describing this de-luxe instrument I shall refrain from superlatives, because otherwise there will be no end to the praise and no beginning to the real details. It will be sufficient if I say that this H.M.V. radio-gramophone is the most ambitious instrument I have ever had an opportunity of testing.

When I remember all that model 531 contains I am amazed that it can be sold for 70 guineas—you get so much for the money. Of course, an instrument in this price class is not everybody's meat, but some indication of the potential market may be gained from the fact that I personally know three people who have bought models since the original was shown at Exhibition time. And I am told by the Gramophone Company that their original factory order has had to be considerably increased to cope with the admittedly unexpected demand.

### A Good Product

It is the old story—people will pay almost any money for a really good product. The H.M.V. instrument shown by the photographs is a good product at a reasonable price; no wonder there is a demand for it.

In designing model 531 the makers have aimed at de-luxe technique at every point. Probably the most technically interesting feature of the radio side is the single-control super-heterodyne circuit, which tunes on medium and long waves.

The super-het circuit comprises six valves of the indirectly-heated type, for this is a set for A.C. mains. The first valve is a screen-grid, then comes the first detector and a separate oscillator, followed by two screen-grid intermediate-frequency valves, and finally the second detector. Needless to say, the ganging of all the four tuning circuits for single-dial control on medium and long waves is a very great achievement, which will be more especially appreciated by those who have any experience of simple super-het circuits.

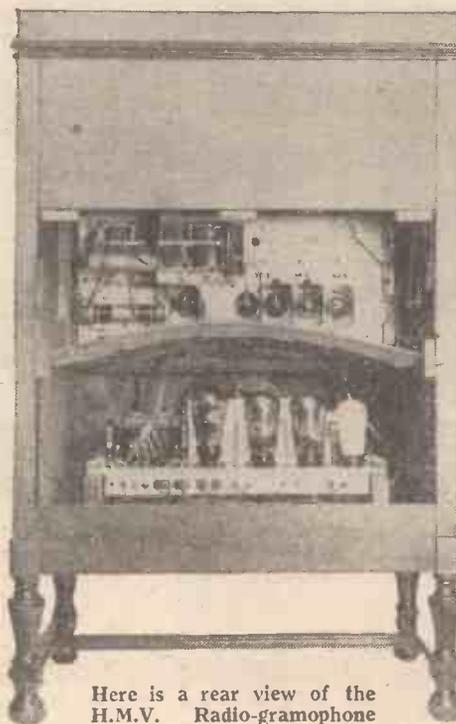
Such a radio circuit confers a degree of sensitivity that could not conceivably be bettered—80 or 90 stations are regularly received on this instrument, as my friends

have testified. And personal tests show that the selectivity more than copes with the present chaos. If a station is clear of a low-frequency heterodyne this instrument will get it clearly. In London the high-power Mühlacker station was received clear of all trace of London Regional, and with a strength and quality approaching the local.

### Separate Power Amplifier

The output of the six-valve super-het set is coupled by the resistance-capacity system to a separate power amplifier, which comprises an input valve coupled by the push-pull method to two PX4 power valves. These give an undistorted output of over 4 watts, representing immense volume—enough to fill a large hall. Up to six extra loud-speakers can be worked from the output without any diminution in volume.

So much for the bare outline of the circuit specification. But there are a hundred and one circuit improvements that I have not the space to mention, although I am sure interested readers would be supplied with full details on writing to the Gramophone Company.



Here is a rear view of the H.M.V. Radio-gramophone showing the many fine features

The main part of the set is the super-het, which comprises a large chassis mounted in the middle section of the cabinet in the radio-gramophone. In the bottom section is the power amplifier and the moving-coil loud-speaker, which, by the way, is of the energised type.

Under the lid at the top is the record mechanism. Here we find the now famous automatic record-changing mechanism, which enables eight records to be played at one loading. These may be either 10-in. or 12-inch records. The mechanism is quite easy to work, and once the two supporting arms have been loaded up the setting down of the pick-up at the beginning of each record is done entirely automatically.

Apart from the automatic mechanism, the top of the instrument carries all the set controls with the exception of the volume control, which, as in all H.M.V. instruments, is mounted on the front of the cabinet, so that volume can be adjusted when the lid is closed.

The radio controls are very simple; there is a local-distance switch knob on the left, very useful in cutting down the amplification when receiving stations within a hundred miles, so that the rest of the set is not overloaded. Then there is the single tuning control knob at the centre, and in addition to actuating all the four tuned circuits this control knob rotates the pointer moving along the horizontal tuning scale, which is calibrated in wavelengths and illuminated when the set is switched on.

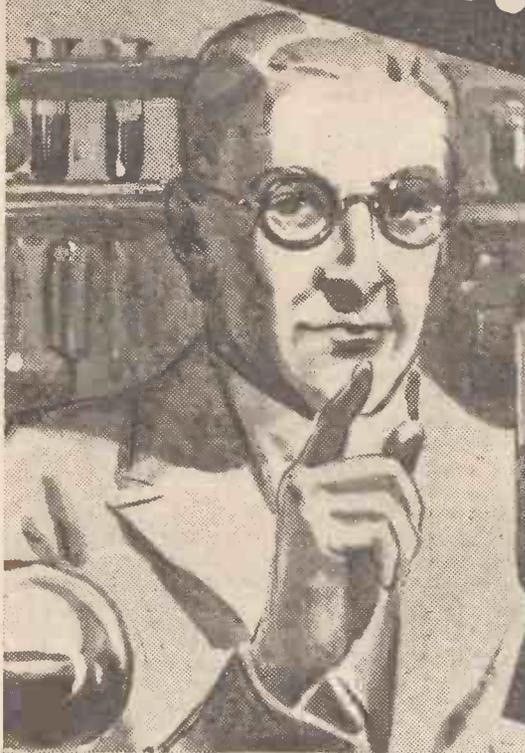
The external volume control knob works on radio and gramophone reproduction—an idea the H.M.V. people originated last year and now followed by several other makers.

I am conscious of having very sketchily described this wonderful instrument, the more so because I am writing this immediately after having left an amazing demonstration of its powers, not only to reproduce records with life-like fidelity, but to cover every requirement of radio reception with the greatest simplicity of control.

During the demonstration I listened to the latest H.M.V. record of "Cavalcade"—a particularly suitable record since it contains renderings by almost every known type of musical combination, as well as several vocal efforts including a running commentary and a choir. I can think of nothing adequate to describe the results, so I advise you to hear a model for yourself—then you will know what can be done for 70 guineas. SET TESTER.

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This Lissen battery is definitely guaranteed to have a much longer life than a 100 volt Lissen battery bought prior to 1st 1st, 1931.

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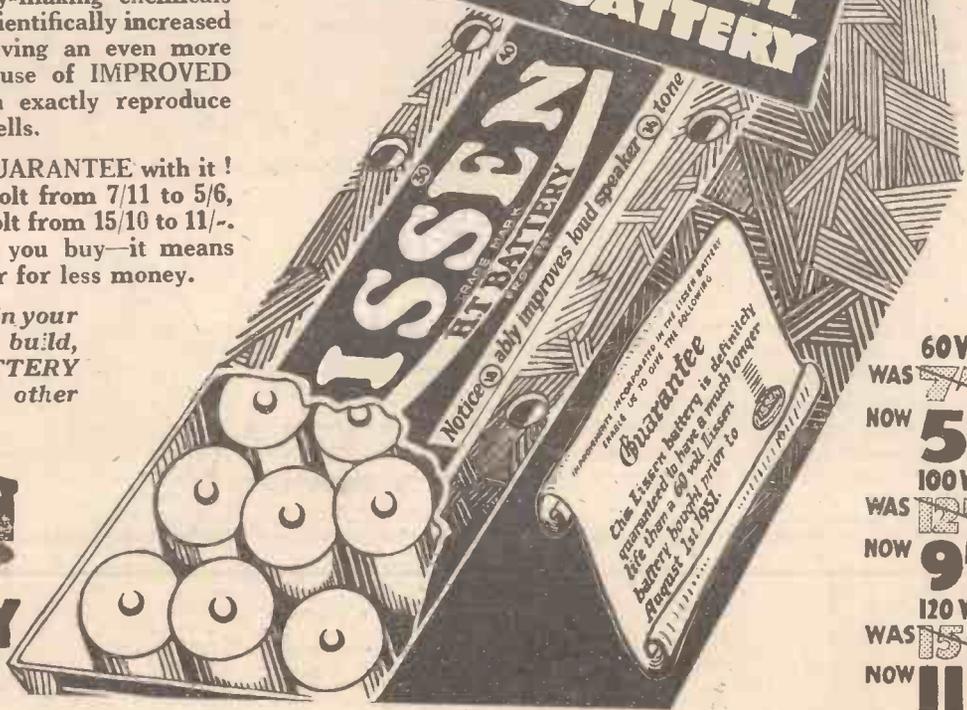
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In your new Ether Searcher, in your big Super-het, in any set you build, this IMPROVED LISSEN BATTERY will last longer than any other battery you can buy.

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**Get this GUARANTEED battery for your Ether Searcher**

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**Short Waves and the "Century Super"**

**S**IR,—I have been extremely satisfied with the results I have obtained with my "Century Super" and now wish to try out my luck with the short waves. I know you have already described how to adapt the set for the ultra-short waves, but I have been unable to obtain the issue of AMATEUR WIRELESS dealing with this particular modification. Will you therefore please assist me by advising what changes are necessary.

A. Q. (Bath).

You should disconnect the frame aerial and substitute a special centre-tapped short-wave coil. Now erect about 10 to 20 ft. of insulated copper wire indoors to act as a short-wave aerial. Connect the lead-down end of the wire to one terminal of a small-capacity variable condenser. A neutralising type of condenser will be satisfactory. The other terminal of this condenser should be joined to terminal No. 1 of the three terminals used normally for the frame aerial connections.—Ed.

**"Britain's Super" and Six-volt Valves**

**S**IR,—I intend building the "Britain's Super" battery model, but wish to employ 6-volt valves instead of the 2-volters specified. I find I am unable to obtain any other than a 2-volt bi-grid. Can you suggest anything that may help me in this matter.

D. S. (London).

You could use a 6-volt supply for 6-volt valves in the set and incorporate a filament rheostat or fixed resistance to limit the voltage and current to the 2-volt bi-grid. The method of determining the correct resistance to use to restrict the current to the 2-volt valve is to divide the excess voltage by the current requirements of the filament. Thus, for a 2-volt .1 of an ampere type bi-grid to be used with a 6-volt accumulator, the correct resistance would be 4 divided by .1 which equals 40 ohms. This resistance should, preferably, be placed in the positive L.T. lead to the bi-grid so as not to upset the arrangement of bias to the valve.—Ed.

**Smoothing Mains Hum**

**S**IR,—I have been informed that by connecting a couple of condensers in series across either A.C. or D.C. mains and taking the centre point between the condensers to earth will often cure excessive mains hum. It seems to me, however, that as large-capacity condensers are used for the purpose of handing on currents through rectifier circuits in A.C. mains units, the use of condensers as suggested above will result in a waste of current from A.C. mains. Am I correct in this assumption or is there something about the arrangement or principle of condensers with which I am not familiar?

D. W. (Kent).

A condenser does not actually allow a current to pass through it in the true sense of the word.

When a fluctuating—alternating or oscillatory—current is applied to or across the terminals of a condenser, fluctuating potentials corresponding to those applied to one plate of the condenser will be transferred to the other plate of the condenser. No actual current will flow through the insulating material separating the two plates or sets of plates of the condenser.—Ed.

**Working Moving-coil Speakers**

**S**IR,—I have just purchased a permanent magnet moving-coil speaker and find it does not give me half the power I usually obtain from an ordinary cone-type speaker. I must admit that I am highly delighted with the quality of reproduction and am loth to give up the idea of using the moving-coil speaker. Can you help me to get sufficient power by suggesting what steps I should take? My receiver is a three-valver, using 2-volt valves, with an ordinary power valve in the last stage. My only wish is to receive the local and Daventry stations with good quality and the set, therefore, has a detector valve followed by a stage of R.C. and a stage of transformer coupling.

F. W. (Bermondsey).

A small power valve is not of much use for driving a permanent-magnet moving-coil speaker. You should use a large power super-power valve. Suitable valves are the Cossor 230XP and the Lissan P240A. Ordinary super-power valves such as the Mullard PM252 or PM202, Mazda P240 or P220A, Marconi and Osram P240 or P2/B and Six-Sixty SS220SP could be used provided the speaker is sufficiently sensitive. Some permanent-magnet speakers are more sensitive than others. The use of a super-power valve (Continued on page 168)

**The Pinnacle of Perfection**



R. & A. Reproducers are designed and produced by specialists in the field of Sound Reproduction. They are built to a standard, and carefully made to ensure conformity to this standard. Their low price is the outcome of specialisation and is not achieved through shoddy materials or workmanship.

Chosen by Mr. G. P. Kendall for the "METEOR III"

Mr. Kendall writes:—

"I think you may be interested to know that after lengthy tests, I have decided upon your Model 40 Chassis as the best value-for-money reproducer I can find for use with our Meteor III. On test I found speech unusually crisp and natural, and the general balance of musical reproduction excellent. Reproduction of bass was also notably better than one expects from any unit of this type, regardless of price, and was, indeed, definitely good. The actual range of frequencies adequately reproduced I found to be surprisingly wide, and at no point thereon did I find a noticeable peak."

**THE R & A "100."** A full-sized PERMANENT MAGNET Moving Coil Reproducer, not a miniature loud-speaker. The first P.M.M.C. Speaker to be offered at 45/-, and still the leader in its class.

"WIRELESS TRADER" reports:—

"In power handling capabilities . . . above the average of its type, . . . will deal with a 5W undistorted A.C. At upper end of the scale the reproduction is very good. . . . The tone will appeal to a wide public . . . plenty of bass and no shrillness. . . . Will work well with quite a modest output valve . . . excellent value for money."

"WIRELESS WORLD" reports:—

" . . . output in lower register from 150 cycles downwards does not fall away, but is maintained as in middle register between 200 and 1,000 cycles . . . curve shows a general increase of level between 1,400 and 4,500 cycles . . . at 6,000 equal to middle register. . . . Reproduction of music is good with well maintained bass . . . speech even better."

3-ratio Output Transformer to suit all Power Valves . . . . . 12/6



R & A TYPE "40"

16/6

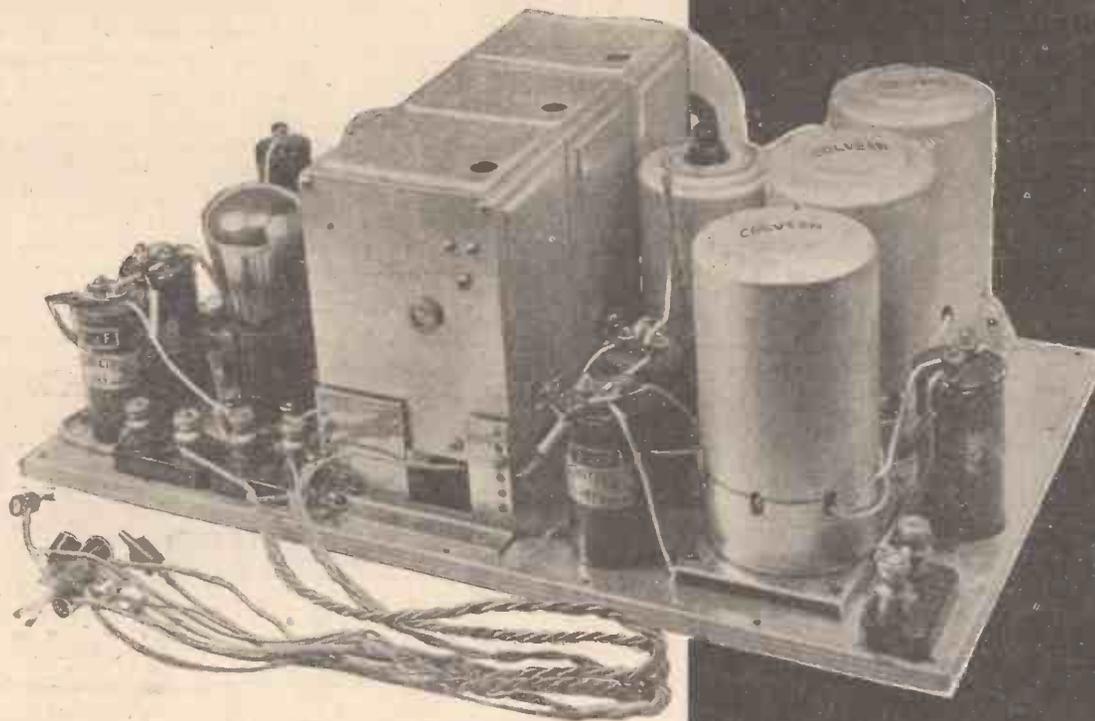
R & A "100" 45/-

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# COLVERN COILS SPECIFIED FOR THE 1932 ETHER SEARCHER



For the third year in succession, Colvern components are used in the "Ether Searcher." Order them now from your dealer—

1 pair Colvern Coils, type KBLC, ganged with 1 KGR - - -	<b>28/-</b>
1 Valve Screen, Type VS - - -	<b>2/9</b>

**COLVERN LIMITED, MAWNEY'S ROAD, ROMFORD, ESSEX**

*To Ensure Speedy Delivery, Mention "A.W." to Advertisers*

## "READERS' IDEAS AND QUESTIONS"

(Continued from page 166)

or large super-power valve means that the H.T. supply must be adjusted accordingly. It is not sufficient to ensure a high voltage. The H.T. supply must be capable of delivering the necessary amount of current. At least 20 milliamperes should be allowed for working the super-power valve alone, whilst 25 to 30 milliamperes is not too much for this valve. Ed.

### Dual-range Coils

SIR.—W. C. A.'s letter in AMATEUR WIRELESS, No. 500, raises an interesting question, although what appears to be the mixing of long-wave winding "skimping" with the trouble of insufficient reaction rather confuses one at first.

I have made up numerous dual-wave coils from particulars given in AMATEUR WIRELESS and "Wireless Magazine," and I have almost invariably found that the number of turns of wire specified did not give me sufficient range on the long waves. The National programme coming in at about 170 degrees did not strike me as being very satisfactory.

Long ago I adopted the simple plan of winding more turns on the long-wave section than the designer specified, and by gradually reducing and testing got the range to my liking. A count of the turns left generally reached a higher figure than the designer gave.

So with reaction. A note of the capacity of the reaction condenser recommended with the particular coil would give a clue to the number of turns necessary to work with the reaction condenser used by the reader-

constructor. Personally, I always found it necessary to nearly double the number of turns and then reduce by test until reaction was satisfactory on both sections. On some coils (solenoid, for instance) it is not always easy to wind on a greater number of turns without upsetting the balance of the remainder of the coil.

J. P. N. (Cardiff).

### Crystal Range

SIR.—The paragraph *re* crystal range reception in AMATEUR WIRELESS dated January 1 is very interesting.

Perhaps you or, maybe, a few of your readers might like to read of the following results on my crystal set, which is home made. I brought in with very fair head-phone volume North Regional, 5XX Daventry, Rome, Milan, Berlin. The volume from Berlin was quite as good as my local station (2RN). This apparently is no freak reception, as I have had them every evening for the past two months.

I would like to hear some further crystal-set results from some of your numerous readers.

F. J. G. (Dublin).

## LISSEN ULTRA SHORT-WAVE COILS

LISTENERS who are now buying short-wave equipment to hear the stations detailed in the short-wave supplement included in this week's issue, should note that a set of four short-wave coils, covering a wide range, are manufactured by Messrs. Lissen, Ltd.

These are extremely sturdy and compact,

the maximum diameter being 1½ in. and the length over the pins 3¾ in. The windings are of heavy gauge tinned-copper wire, held in grooves cut in a six-ribbed ebonite former.

A practical point is that each former is



Two of the set of four Lissen short-wave coils

extended beyond the winding and is fitted with a handy knob so that the coils can be inserted and withdrawn from the holder without any risk of damaging the winding.

The set includes four coils which, when tuned with a .00015-microfarad condenser range from 10-20, 18-32, 30-50, and 50-80 metres, thus covering the most popular short-wave bands. The four coils cost only 16s. per set.



## A new version of the famous REGENTONE ALL-ELECTRIC RECEIVER

— now with built-in speaker

£8 . 10 . 0

or 20/- down and 11  
monthly payments of 16/-

Specified in the  
"1932 ETHER SEARCHER"

REGENTONE  
MODEL W.1.A  
for A.C. Mains  
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REGENTONE  
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REGENTONE D.C. Mains  
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Here is a new version of the famous "Regentone" two-valve A.C. all-electric receiver—in a handsome walnut-finished cabinet, with built-in loud-speaker. It costs, complete with B.V.A. valves, only £8 : 10s. cash or £1 down and eleven monthly instalments of 16s. each. If you already have a good speaker, there is the original "Regentone" two-valve all-electric receiver, contained in a walnut-finished bakelite cabinet, complete with B.V.A. valves—£6 : 15s. cash or 15s. down and eleven monthly instalments of 12s. 9d. each. British made throughout—chassis built—what remarkable receivers they are! Giving National and Regional programmes at loud-speaker strength, and other British and Continental stations as well. Really keen selectivity—a few degrees on the dial cuts out your local station in any part of the country. Simple to operate, one tuning dial only! Your local dealer will be pleased to give you a demonstration and all particulars, or write to Regentone, Ltd., for free art booklet giving full details of these receivers and other "Regentone" products.



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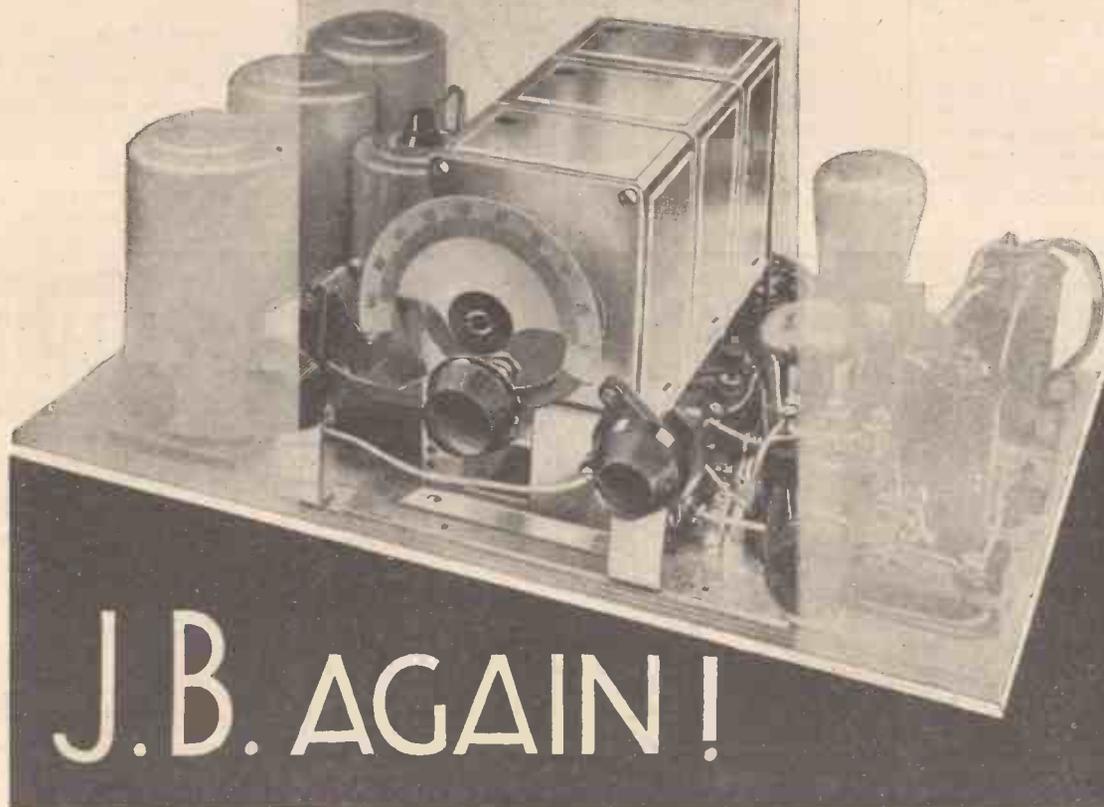
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IN THE**

1930  
1931  
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**ETHER  
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**J.B. AGAIN!**

Everyone knows the phenomenal success achieved each year by the "Amateur Wireless" "Ether Searcher." Last year's model, the second, was easily the most popular constructor-set of the season! Simple to operate, selective, powerful . . . and each year the condensers used by the designer have been J.B.

Now, 1932 brings in a new and even better "Ether Searcher." This is the set you must build if you want the best results. *BUT—follow the specification. Use the condenser the designer used.*

**The J.B. R3 GANG . . . 29/6**



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# RADIOGRAMS

**T**HE PRINCE OF WALES will broadcast from the Royal Albert Hall on January 27, when he attends a meeting organised by the National Council of Social Service. The Prince's address will be preceded by a speech by Captain E. A. Fitzroy, M.P., Speaker of the House of Commons, and this also will be broadcast.

A running commentary on the International Rugby match between Ireland and England is to be broadcast from Belfast on February 13. The commentary will be under the direction of the Dublin Broadcasting Station and the commentator will be Mr. W. P. Collopy, who acted in a similar capacity in the match between Ireland and the Springboks.

A sequel to the sing-song, "Nuts and Wine," which was broadcast early last month, will be heard by National listeners on February 6. It will be called "Cakes and Ale" and, as on the occasion of the previous programme, Alan Howard will be

the producer. Frederick Grisewood (baritone) is the soloist. He is one of the London announcers!

The first relay from Sadler's Wells Theatre takes place on January 30, when Act 3 of *Tales of Hoffman* is to be heard by National listeners. Two frequent broadcasters are in the cast for the Sadler's Wells relay, Tudor Davies and Franklyn Kelsey.

Two vaudeville programmes from the National transmitters which should be well worth hearing are to be given on January 28 and 30. In the first Ronald Gourley and Elsie and Doris Waters take part. The second programme includes the Carlyle Cousins, Nobby Knight, Leonard Henry, Jack Collings, George Wood, Edith and Sonia Watson, Carr Lynn, the Three Eddies and Max Miller.

On February 4 an excerpt from a concert in the Scottish National Academy of Music, arranged by Dr. W. G. Whittaker, will be broadcast.

Professor W. J. Gruffydd will be heard during the Welsh Interlude relayed by Daventry National on February 6.

For the first time on a Saturday night, a "Nine-Thirty Novelty" will be broadcast on February 6. This is number seven of Mr. Charles Brewer's popular series, and listeners to Midland Regional will hear this programme.

Kathleen Cooper will be the sole artiste at the Philharmonic Midday Concert which will be broadcast from Queen's College, Birmingham, on February 4.

A Shakespearean recital by Henry

Baynton is a feature of the Midland Regional programmes on February 2.

The North Regional programme on January 24 will begin with a half-hour's violin recital by Alfred Barker, accompanied by Eric Fogg.

Mr. Will John, M.P. for Rhondda West, is appealing for the Rhondda Institute for the Blind on January 31. Because of idle collieries, voluntary contributions have dropped heavily this year. West Regional listeners will hear this appeal.

The centenary of Lewis Carroll's birth is to be celebrated on January 27 by a special feature programme from the North Regional transmitter, in which most of his best known works will be remembered.

A "Wagner" concert has been arranged by the Sutton Coldfield Musical Committee, and will be broadcast from the Town Hall, Sutton Coldfield, on February 1.

### "THE A.B.C. OF ALL-ELECTRIC RADIO"

**I**N next week's issue of "Amateur Wireless" will appear the first of a special series of articles on mains working for the amateur. Each article will be complete in itself, but the whole series will cover every important aspect of this interesting subject. An important point about the articles will be their treatment from an essentially practical angle.

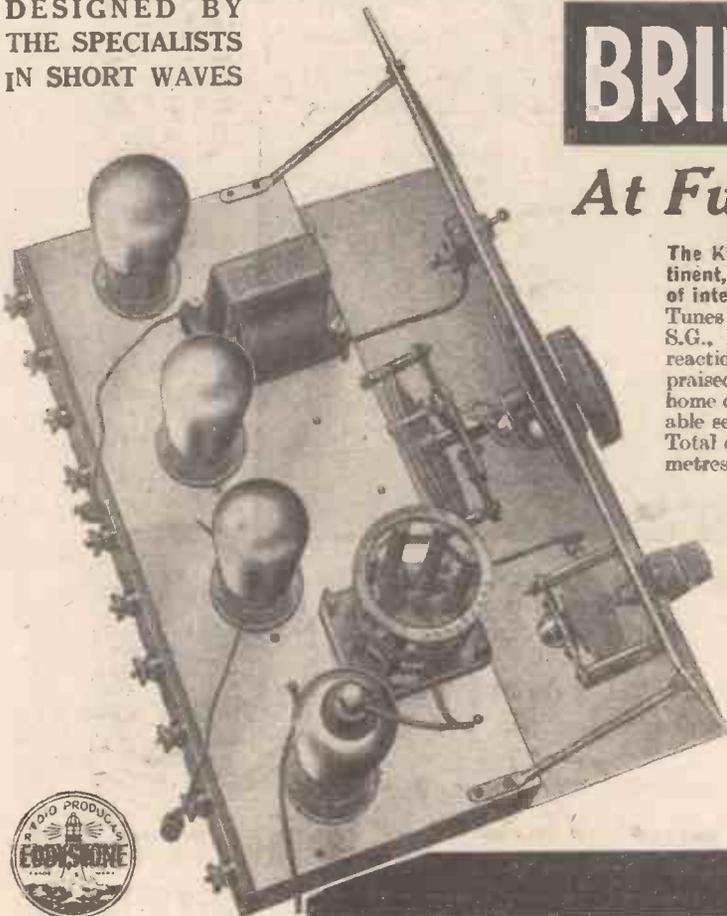
"Amateur Wireless and Radiovision." Price Threepence. Published on Thursdays and bearing the date of Saturday immediately following. Post free to any part of the world: 3 months, 4s. 6d.; 6 months, 8s. 9d.; 12 months, 17s. 6d. Postal Orders, Post Office Orders, or Cheques should be made payable to "Bernard Jones Publications, Ltd."

General Correspondence is to be brief and written on one side of the paper only. All sketches and drawings to be on separate sheets.

Contributions are always welcome, will be promptly considered, and if used will be paid for.

Communications should be addressed, according to their nature, to The Editor, The Advertisement Manager, or The Publisher, "Amateur Wireless," 58-61 Fetter Lane, London, E.C.4.

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THE SPECIALISTS  
IN SHORT WAVES



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## At Full Loud-speaker Volume!

The Kilodyne 4 is the voice of the world, it receives stations from every Continent, and operates at loud-speaker volume. It opens up a vast new field of interest to the wireless fan.

Tunes down to 12 metres and is adaptable up to 2,000 metres, incorporates S.G., H.F. amplification, absolutely no hand capacity, perfectly smooth reaction, one dial tuning, has been designed by short-wave specialists and praised by leading short-wave critics. It is supplied complete ready for any home constructor to assemble easily or the individual components are obtainable separately.

Total cost of all parts, with blueprints, leads, grid battery, coils for 12.5/85 metres, not including valves, £6 17s. 6d.

Set of blueprints, constructional details, and list of parts, 1s. 6d., post free.

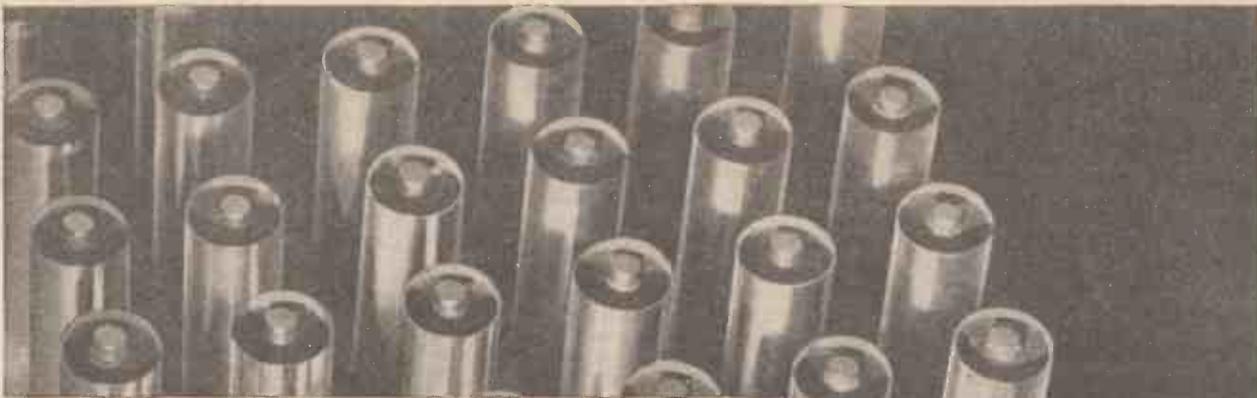
**NOTE.**—The Eddystone Short-wave Apparatus incorporated in the S.W. converter and adapter described in this issue can be obtained through any genuine radio dealer. If any difficulty, advise us.

Sole Manufacturers:  
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## BRITISH MAKERS introduce standardisation into dry battery manufacture . . .

A dry battery is a collection of small cells. Like a company of soldiers it operates most successfully when each individual is equally strong, equally efficient and equally energetic. That is why the FULLER machine-made and tested 'Super' Battery is proving its superiority under all conditions in the field of wireless. The FULLER cells are standardised by machinery. Each part, each detail, each ingredient is identical in every cell, no matter how many are turned out. Each step in construction is automatically correct. Result—a perfect dry battery. A battery, too, which is British-made. The perfection of the Fuller 'Super' emphasises the benefit of Buying British.

Fuller H.T. Dry Batteries are obtainable in all types and sizes—60-120 volts—at prices ranging from 5/3 to 15/3. Also Portable, Triple and Grid Bias Batteries and a full range for Torch, Flashlamps, Cycle Lamps and Electric Bells. Write for list D3.

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# WET OR DRY ?

For refinement of tone, altogether free from background noises you cannot use anything better than C.A.V. H.T. Accumulators. They last for years and are no more expensive in the long run than Dry Batteries.

If you find it more convenient to use Dry Batteries, we offer a complete range from which to select. It is a good Battery upholding the reputation of "The World's Best" by which all C.A.V. Batteries are known. Next time try a C.A.V.

Obtainable from our Battery Service Agents and Traders throughout the country.

Before investing in a new battery, let us send you full details of all C.A.V. Radio Accumulators.

\*FREE A useful booklet on the maintenance and charging of L.T. and H.T. Accumulators.

Department C.4

**C. A. VANDERVELL Ltd., WELL ST., BIRMINGHAM**

Amateur Wireless recommend a C.A.V. L.T. Accumulator for the "1932 Ether Searcher."

## FOR HIGH TENSION

**INDIVIDUALLY BUILT  
for the DISCERNING BUYER**

## TANNOY

Make your battery set all-Electric. Constant... reliable and without Hum.

## Mains Units

- |  |  |  |
|--|--|--|
| <p>Type<br/><b>G.B.1</b><br/>Pat. No. 353375.</p> <p>Type<br/><b>P.1</b></p> <p>Type<br/><b>C.P.2</b><br/>For H.T. &amp; L.T.</p> <p>Type<br/><b>G.B.3</b><br/>Pat. No. 353375</p> | <p>H.T. { 1. Max 150v. at 15 m/a or 120v. at 20 m/a.<br/>2. Tapping at 80/90v.<br/>3. " at 60/70v.</p> <p>L.T. 2, 4 or 6v. Trickle Charger.</p> <p>G.B. 1 - 1½v. 2 - 4½v. 3 - 12v.<br/>Independent Grid Bias.</p> <p>H.T. { 1. Max. 150v. at 15 m/a. or 120v. at 20 m/a.<br/>2. Tapping at 80/90v.<br/>ONLY 3. " at 60/70v.</p> <p>L.T. { With two variable tappings 120v. at 15/20 m/amps.<br/>2, 4 or 6v. Trickle Charger.</p> <p>H.T. { 1. Max. 175v. at 25 m/a. or 160v. at 23 m/a.<br/>2. Tapping at 80/90v.<br/>3. " at 60/70v.</p> <p>L.T. 2, 4 or 6v. Trickle Charger.</p> <p>G.B. 1 - 1½v. 2 - 4½v. 3 - 13½v.</p> | <p>PRICE £4 15 or 9/2 and 11 monthly payments of 8/8</p> <p>PRICE £2 19 6 or 6/- and 11 monthly payments of 5/5</p> <p>PRICE £5 or 9/2 and 11 monthly payments of 9/2.</p> <p>Similar to G.B.1 but with larger outputs.</p> <p>PRICE £5 10 or 15/- and 11 monthly payments of 9/3.</p> |
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Write for Particulars to:  
**TANNOY PRODUCTS, DALTON ST., W. NORWOOD, S.E.27**  
Telephone: STREATHAM 6731/2

# 3 SOVEREIGN

**COMPRESSION-TYPE CONDENSERS  
SPECIFIED THIS WEEK**



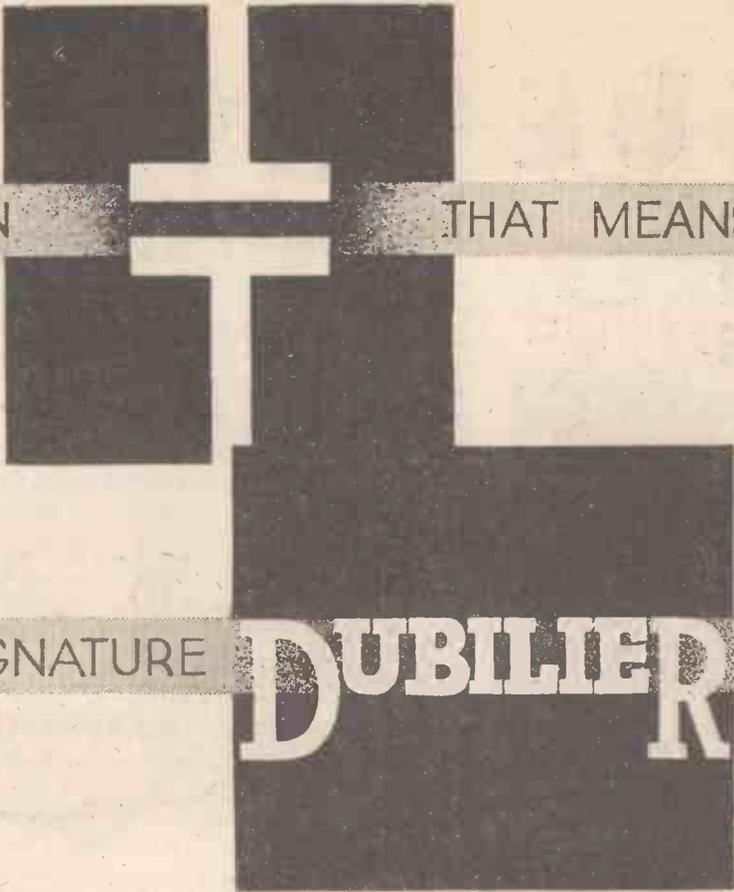
IN  
**1932 ETHER SEARCHER  
and 5 VALVE SUPER-HET  
SHORT-WAVER**

If your dealer cannot supply you with Sovereign send direct, also for free Catalogue of full range of Sovereign Components.

**SOVEREIGN PRODUCTS, LTD.**  
52/54 ROSEBERY AVE. E.C.1

There is never a really important set published without Sovereign. So as well as being specified for the new 1932 "Ether Searcher," two Sovereign Compression-Type Condensers are specified in addition for the 5 Valve Short-wave Super-het described this week. Recommendations in two such distinctive sets as these should convince you of the wisdom of using Sovereign as much as possible when building them. The Sovereign catalogue will help.

Type "F" .0001 mfd. **1/3** each  
Type "J" .0003 mfd. **1/3** each  
Type "G" .001 mfd. **1/6** each  
Type "H" .002 mfd. **1/6** each



THE SIGN THAT MEANS CONDENSER

THE SIGNATURE **DUBILIER** THAT MEANS

A radio condenser has to be taken on trust. You cannot SEE how carefully or how carelessly it has been made, how well or how ill it is going to serve your needs. Your only guide to its selection is the name it bears . . . Choose, then, a name that has won the respect of every radio user in the world; a name that has been associated with every advancement in radio history; a name that stands, and always will stand, for the highest standard of quality, efficiency and reliability that it is possible to attain.

A GOOD CONDENSER...

# DUBILIER CONDENSERS

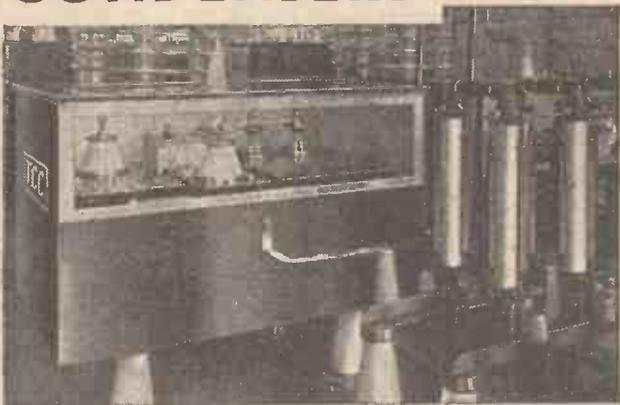
DUBILIER CONDENSER CO. (1925) LTD.  
DUCON WORKS, VICTORIA ROAD, NORTH ACTON, LONDON, W.3  
E.1.

*Don't Forget to Say That You Saw it in "A.W."*

# PRAGUE

## COMES TO T.C.C. FOR CONDENSERS

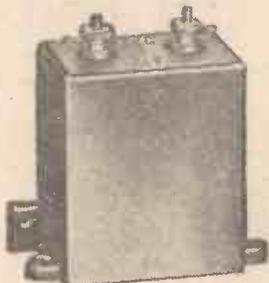
★ The world's largest medium wave station—200 K.W.



Here is illustrated a corner of the new Prague Station, and shows a bank of 4 T.C.C. Condensers, comprising a .00075 mfd. and a .0005 mfd. for working at 6,500v. R.M.S. at 500-1,000 K.C.; 100% T.M. with peak working voltage of 13,400; together with a .0005 mfd. and a .0004 mfd. for working at 4,500v. R.M.S. at 550-1,000 K.C. 100% T.M.

Yet again T.C.C. Condensers are being used where accuracy and down-right dependability are essential. The very life of this station is dependent on the perfect functioning of these condensers. The engineers made certain of unfailing service—and specified T.C.C.

## — AND WHEN YOU NEED A CONDENSER



Here is illustrated just one of the many types of T.C.C. Condensers—a 2 mfd. Non-Inductive Condenser, price 3/10. Made in capacities from .005 to 2 mfd.

# T.C.C.

## ALL-BRITISH CONDENSERS

The Telegraph Condenser Co. Ltd., Wates Farm Road, N. Acton, W.3.

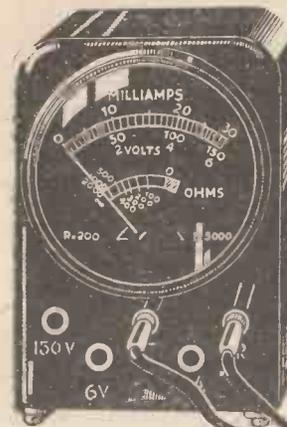
9637

# What's wrong

BATTERIES ? ANODE CURRENT  
DUD VALVES ? RESISTANCE VALUES  
FAULTY COMPONENTS!  
VALVE DISTORTION!

It might be anything!

## BUT WATES "UNIVERSAL"



## TEST METER

detects it whatever it is. Four readings on one dial, including special resistance measurement scale; fitted with battery for valve and circuit testing. Readings: (1) 0-150 volts for H.T. (2) 0-6 volts for L.T. (3) 0-30 milliamps for current. (4) Resistances 0-2,000 ohms. Complete with long flex leads and full instructions for tuning your receiver to the highest possible pitch of perfect performance.

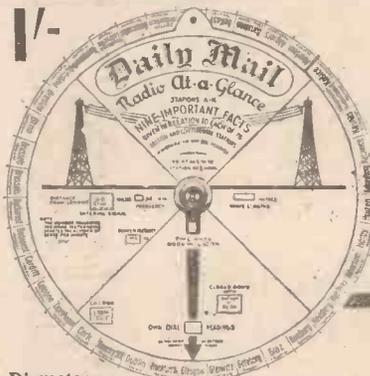
12/6

Of all Radio Dealers or direct from us. Explanatory leaflets Post Free.

STANDARD BATTERY CO.

184-8, Shaftesbury Avenue, W.C.2 LONDON

R & T



## IDENTIFY FOREIGN STATIONS

DON'T WASTE TIME TURNING OVER LEAVES OF BOOKS AND PAPERS. THIS WONDERFUL LITTLE WIRELESS FRIEND GIVES 9 FACTS ABOUT 76 STATIONS "AT-A-GLANCE," AND ONCE FOUND THEY CAN BE LOCATED IMMEDIATELY.

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Diameter, 9 1/2 ins. Two-sided, printed in colours. Ask to see other "At-a-Glance" charts at

Stationers, Bookstalls, Radio Stores, &c., or if any difficulty write to Frank Pitchford & Co., Ltd., Well House, Well St., London, E.C.1



## HOUSE YOUR RADIO-GRAM IN A CAMCO CABINET!

This is the Camco "Waverley" Radio-Gram Cabinet. It is beautifully finished in Oak and Mahogany, and is made in two models—Junior and Senior. Full provision is made for an electric or clockwork gramophone motor. From 25.10.0. Write for FREE copy of the 24-page Camco Radio-Cabinet Catalogue.

CARRINGTON MFG. CO., LTD.,

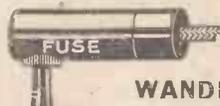
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# REDUCED FUSE PRICES



## WANDERFUSE

Fuse and wander plug combined. Lies flat on battery top—takes no extra space. Use one in the H.T.—lead to protect valves and H.T. supply. Fitted without tools. Complete with 150 m/A fuse. **1/2**  
Reduced from 1/6 to



## SINGLE BASEBOARD FUSEHOLDER

The best method of mounting fuses inside any set. Complete with 1/2 amp. fuse. Reduced from 1/3 to **1/4**



## TWIN BASEBOARD FUSEHOLDER

With two 1-amp. fuses for mains leads. Reduced from 2/6 to **3/6**

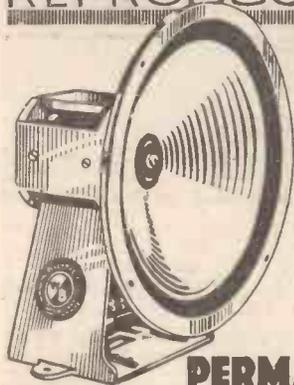


Spare fuses, all ratings, 6d. each.  
(60 m/A, 150 m/A. & 1, 2 and 3 amps.)

**BELLING-LEE**  
FOR EVERY RADIO CONNECTION

Advt. of Belling & Lee, Ltd., Queensway, Ponders End, Mdx.

# TRUE MOVING-COIL REPRODUCTION



from **ANY** 2, 3 or multi-valve set

Selling in thousands. The astonishing W.B. Model, P.M.3.

## PERMANENT MAGNET MOVING-COIL SPEAKER

**45/-**

Three-ratio output transformer extra - 7/6  
Handsome Grained Oak Cabinet - 50/-

Made by the makers of the famous W.B. Valveholders and Switches

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# FROM THE BLUEPRINT CURVE TO THE FINISHED DARIO VALVE

Dario valves are made in one of the most modern factories in the world. They are manufactured under a special secret process. They incorporate the new Radio Micro Dull Emitter. From the Dario range you can select a valve that is suitable for every current and purpose.

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| <b>DARIO SCREENODION BIVOLT</b><br>Price 12/6   | <b>DARIO SCREENODION BIVOLT A.C. MAINS</b><br>(Indirectly Heated Cathode)<br>Price 18/6 |
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| <b>DARIO HYPER POWER BIVOLT</b><br>Price 8/-    |   |

Also the newest DARIO addition—**DARIO DETECTOR BIVOLT.** A perfect non-microphonic detector! 6/-

WRITE FOR ILLUSTRATED LEAFLET GIVING FULL DETAILS OF THE NEW DARIO VALVES.



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**IMPEX ELECTRICAL LTD., 538, High Road, LEYTONSTONE, LONDON, E.II.**

Mention of "Amateur Wireless" to Advertisers will Ensure Prompt Attention

Use the Batteries  
chosen for the  
1932

ETHER SEARCHER

★  
**Exide**

FOR L.T.



Type DFG; 45 ampere hours.  
Price per 2 volt cell, 8/6.

**Drydex**

FOR H.T.



Orange Triangle,  
Type H. 1015, 120  
volts. Price 24/-.  
For Grid Bias, Drydex  
Green Triangle, Type  
H. 1008, 16.5 volts.  
Price 2/6.

Obtainable from Exide Service Stations and all good  
dealers. Exide Service Stations give service on every  
make of battery.

Exide Batteries, Exide Works, Clifton Junction, near Manchester. Branches  
at London, Manchester, Birmingham, Bristol, Glasgow, Dublin and Belfast.

"We're Fluxite and Solder, The reliable pair, Famous for Soldering—Known everywhere! We SOLDER all connections; Without any fuss, So, wherever there's WIRELESS, You're bound to find US!"

See that Fluxite and Solder are always by you—in the house, garage, workshop—anywhere where simple, speedy, soldering is needed. They cost so little, but will make scores of everyday articles last years longer! For Pots, Pans, Silver, and Brassware; RADIO; odd jobs in the garage—there's always something useful for Fluxite and Solder to do.

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**FLUXITE SOLDERING SET**  
Simple to use and lasts for years in constant use. Contains special "small-space" soldering iron with non-heating metal handle; pocket blow-lamp Fluxite, Solder, etc.; and full instructions.  
COMPLETE, 7/6, or LAMP only, 2/6.

FLUXITE, LTD.  
(Dept. 326)  
ROTHEMOUTH, S.E.16

ALL MECHANICS WILL HAVE  
**FLUXITE**  
IT SIMPLIFIES ALL SOLDERING

PIFCO

**ALL IN ONE**  
RADIOMETER

VALVE TEST  
COMPONENT TEST  
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PIFCO  
TO H.T. OR B.T.  
BATTERIES  
TOTAL DISCHARGE from BATTERY  
M AMPS DISCHARGE ON ONE TAPPING

The Sherlock Holmes of your Radio

**12/6**

There is no instrument like it. You must have one to secure best reception. Tests everything in your set!

Your Radio or Electrical Dealer can supply. If any difficulty, write Pifco Ltd., High Street, Manchester.

To Ensure Speedy Delivery, Mention "A.W." to Advertisers

# Postcard Radio Literature

## GET THESE CATALOGUES FREE

Here "Observer" reviews the latest booklets and folders issued by well-known manufacturers. If you want copies of any or all of them FREE OF CHARGE, just send a postcard giving the index numbers of the catalogues required (shown at the end of each paragraph) to "Postcard Radio Literature," "AMATEUR WIRELESS," 58/61, Fetter Lane, E.C.4. "Observer" will see that you get all the literature you desire. Please write your name and address in block letters.

### Measuring Instruments

ENTHUSIASTS should get Part 3 of the new Catalogue F issued by Claude Lyons, Ltd. This describes laboratory-type testing gear which will interest discerning set users. **682**

### Mains Parts

Here is a new folder from Clarke's (Atlas,) giving details of power transformers and chokes. Full technical information is given. This useful folder may be had free. **683**

### For Your Igranic File

New leaflets are constantly being issued for inclusion in the Igranic loose-leaf folder. A new sheet is No. 6528, describing controls and slow-motion dials. **684**

### Home Recording

If you have not yet tried making your own gramophone records, you will be keen to see the illustrated folder dealing with the Kingston Wearite home-recorder system. **685**

### Choosing a Resistance

You will find plenty of resistances, ganged and single type, in the new Rotor Electric, Ltd., folder. Free copies are available. **686**

### A New Philips Set

The new "Philips Super Inductance Five" is making a good name for itself. Several types are available and a free folder may be had describing them. **687**

### A Lewcos Book

I have just received the new Lewcos catalogue for this season. Super-het coils and the new Lewcos band-pass filter take pride of place. Useful wire tables are included, and a number of helpful circuits are given. **688**

### The Inventors' Pocketbook

Enthusiasts who are interested in patenting any wireless ideas should get through my Free Catalogue Service, a copy of the handy "Inventors' Pocketbook," produced by Messrs. Edwin C. Axe, the well-known patent agents. This makes the whole position very clear. **689**

### Electrad Resistances

Fixed resistances and wire-wound "pots" are dealt with in the new Electrad catalogue distributed by the Rothermel Corporation, Ltd. Useful circuits and performance curves are given. **690**

OBSERVER

# New Times Sales Co

## STRICTEST PRIVACY

We appreciate the necessity for confidential transactions — that's why you will find us best for RADIO ON EASY TERMS

### 1932 ETHER SEARCHER • SPEAKERS

#### SPECIAL PARCEL

Comprising J.B.2 Gang Condenser (£1 9s. 6d.); Set of Colvern Coils, (£1 8s. 6d.); and 6 Dubilier non-inductive Condensers (14s.). Balance in 11 monthly payments of 6s. 7d. **CASH PRICE £3 12s. 0d.**

With **6/7** order

### • MANUFACTURERS' KITS

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With coils, less valves and cabinet. Balance in 7 monthly payments of 5/6. **CASH PRICE £1 19 6**

**5/6** WITH ORDER

#### TELSEN THREE

Less valves and cabinet. Balance in 7 monthly payments of 5/6. **CASH PRICE £1 19 6**

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With valves, less cabinet. Balance in 11 monthly payments of 10/10. **CASH PRICE £5 17 6**

**10/-** WITH ORDER

#### COSSOR EMPIRE MELODY MAKER, MODEL 234

With valves and cabinet. Balance in 11 monthly payments of 12/6. **CASH PRICE £6 15 0**

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With valves and cabinet. Balance in 11 monthly payments of 19/8. **CASH PRICE £10 15 0**

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With triple-wave switch operated coil, less valves and cabinet. Balance in 11 monthly payments of 5/11. **CASH PRICE £3 5 0**

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#### READIRAD METEOR 3

Less valves and cabinet. Balance in 11 monthly payments of 6/11. **CASH PRICE £3 15 0**

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### • ACCESSORIES

**GARRARD INDUCTION GRAMOPHONE MOTOR.** Model 202. For A.C. Mains. Mounted on 12-in. Nickel Motor Plate with fully automatic electric starting and stopping switch. Cash price **£2 18s. 6d.** Balance in 11 monthly payments of 5/4 only.

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With **7/1** order

**PILOT PERMANENT MAGNET MOVING-COIL SPEAKER,** in handsome solid oak cabinet with multi-ratio input transformer. Cash price **£3 15s. 0d.** Balance in 11 monthly payments only of 6/11.

Send **6/11** only

**BLUE SPOT SPEAKER UNIT AND CHASSIS.** Type 100 U. Cash Price **£1 19 6.** Balance in 7 monthly payments of 5/5.

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### • ELIMINATORS

**EKCO K.12 H.T. ELIMINATOR AND L.T. TRICKLE CHARGER.** Delivers 12 m/a. Tapped at 80 v. (S.G.) 120/150 v. Charges 1/2 amp. at 2, 4, or 6 v. Cash price **£3 19s. 6d.** Balance in 11 monthly payments of 7/2.

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With **5/6** order

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(a) Please send me Free your 1932 Radio Catalogue.....

(b) Please send me further particulars of.....

(c) I enclose.....s.....d. as first payment for.....

NAME .....

ADDRESS .....

A.W. 23/1/32.



**ALL ELECTRIC MAINS UNITS**

Heyberd, Model E, Mains Units provide for your receiver's present and future needs. Westinghouse Rectification, pilot lamp, silver-embossed switches. Ready to switch on. Guaranteed 3 years.

**MODEL E 200**

H.T. output: 200 v. at 30 ma. Tappings: 60/80 volts var. S.G. 150 v. and 200 v. fixed L.T. 4 v. 4 amp. for A.C. valves, 2 volts trickle charger. **150/-**

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MASTERS OF THE MAINS.

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METEOR 3 KIT ..	£3/15/-	6/10 11 of 6/10
EXIDE H.T. Accum., 120v. £3	6/-	9 of 6/8
BLUE SPOT 66R AND CHASSIS ..	£2/2/6	5/6 9 of 4/6
BLUE SPOT 100U ..	39/6	5/8 7 of 5/4
AMPLION M.C.6 ..	67/6	7/5 9 of 7/5
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**BECOL REAL EBONITE**

has stood this and is the most reliable

Formers tested electrically before Despatch. 26 Types

**REDUCED PRICES**

PANELS TUBES RODS British Made

LOOK FOR TRADE-MARK

**THE BRITISH EBONITE CO., LTD.**  
HANWELL, W.

# BROADCAST TELEPHONY

Broadcasting Stations classified by country and in order of wavelengths. For the purpose of better comparison, the power indicated is that of the carrier wave.

Kilo-Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Kilo-Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)	Kilo-Metres	Kilo-cycles	Station and Call Sign	Power (Kw.)
<b>GREAT BRITAIN</b>											
25.53	11,751	Chelmsford (G6SW)	10.0	317.3	945.4	Marseilles	1.6	<b>LITHUANIA</b>			
242.3	1,238	Belfast	1.0	327.5	916	Grenoble (PTT)	2.0	1,925	755	Kaunas	7.0
261.5	1,147	London Nat.	60.0	329.3	911	Poste Parisien	1.2	<b>NORTH AFRICA</b>			
288.5	1,040	Newcastle	1.2	345.2	869	Strasbourg (PTT)	11.5	303.4	825.7	Algiers (PTT)	15.0
288.5	1,040	Swansea	0.12	370.4	810	Radio LL (Paris)	0.5	416	721	Radio Maroc (Rabat)	10.0
288.5	1,040	Plymouth	0.12	447.1	671	Paris (PTT)	0.7	<b>NORWAY</b>			
288.5	1,040	Edinburgh	0.3	466	644	Lyons (PTT)	1.5	235.5	1,274	Kristiansand	0.5
288.5	1,040	Dundee	0.12	1,445.7	207.5	Eiffel Tower	13.0	240.2	1,249.2	Stavanger	0.5
288.5	1,040	Bournemouth	1.0	1,724.1	174	Radio Paris	75.0	364	824	Bergen	1.0
301.5	995	North National	60.0	<b>GERMANY</b>							
309.9	968	Cardiff	1.0	19.73	15,226	Zeesen	15.0	367.6	816	Frederiksstad	0.7
355.9	843	London Regional	50.0	31.38	9,560	Zeesen	15.0	493.4	662	Porsgrund	0.7
376.4	797	Glasgow	1.0	217	1,382	Königsberg	0.75	560	536	Hamar	0.8
398.9	752	Midland Regional	25.0	217.5	1,370.0	Flens-burg	0.5	1,091	275	Oslo	60.0
480	625	North Regional	50.0	227.4	1,319	Cologne	1.5	<b>POLAND</b>			
1,654.4	193	Davenport (Nat.)	30.0	227.4	1,319	Münster	0.5	214.2	1,400	Warsaw (2)	1.9
<b>AUSTRIA</b>											
218.7	1,375	Salzburg	0.5	292.2	1,292	Kiel	0.25	234.0	1,283	Lodz	2.2
245.9	1,220	Linz	0.5	289.4	1,253	Nürnberg	2.0	312.8	959	Cracow	1.5
285.2	1,052	Innsbruck	0.5	245.9	1,220	Cassel	0.25	334.4	897	Poznan	1.9
352.1	852	Graz	7.0	258	1,184	Gleitwitz	5.0	380.7	788	Lovno	16.0
453.2	666	Klagenfurt	0.5	259.3	1,157	Leipzig	2.0	409.3	732	Katowice	14.0
617	581	Vienna	15.0	269.8	1,112	Bremen	0.2	530	506	Wilno	16.0
also testing on 1,237 m. from 7.0 p.m. (Mon., Wed., Sat.)											
<b>BELGIUM</b>											
206	1,456	Antwerp	0.25	283	1,060	Magdeburg	0.5	1,411.8	212.5	Warsaw	120.0
208.3	1,440	Liège	0.15	283	1,060	Berlin (E)	0.5	<b>PORTUGAL</b>			
215.3	1,393	Chateleineau	0.2	283	1,060	Stettin	0.5	290.5	1,033	Lisbon (CTIAA)	2.0
216	1,389	Liège	0.1	283	1,060	Dresden	0.25	also on 42.9 m. (Fri.)			
216	1,389	Bruxelles	0.1	318.8	941	Breslau	1.5	<b>ROMANIA</b>			
Conference											
219.7	1,365.5	Binche	0.2	325	923	Mühlacker	60.0	304	761	Bucharest	12.0
240.8	1,245.8	Liège	0.1	372	806	Hamburg	1.5	<b>RUSSIA</b>			
273	1,095	Radio Cointe	0.4	389.6	770	Frankfurt	1.5	494.3	707	Moscow-Stalin	100.0
280.2	1,071	Brussels (SBR)	0.5	419	716	Berlin	1.5	720	416.6	Moscow (PIT)	20.0
338.2	887	Brussels (No. 2)	15.0	453.2	662	Danzig	0.5	937.5	320	Kharkov (Rv20)	25.0
509	590	Brussels (No. 1)	15.0	472.4	635	Langenberg	60.0	987.7	316	Alma-Ata	10.0
<b>BULGARIA</b>											
318.8	941	Sofia (Kodina Radio)	0.5	532.9	563	Munich	1.5	1,000	300	Leningrad	100.0
<b>CZECHO-SLOVAKIA</b>											
240.6	1,201.8	Prague (2)	5.0	559.7	536	Kaiserslautern	1.5	1,034.5	290	Tiflis	10.0
263.8	1,137	Moravska-Ostrava	10.0	559.7	536	Augsburg	0.3	1,116	268.5	Moscow Popoff	75.0
279	1,076	Bratislava	13.0	556	530	Hanover	0.3	1,170	255.4	Tascherit	25.0
293	1,022	Koalice	2.5	569.3	527	Freiburg	0.25	1,304	230	Moscow (Unions)	165.0
341.7	873	Brunn (Brno)	31.0	1,634.9	183.5	Zeesen	60.0	1,481	202.5	Moscow	100.0
488.6	614	Prague	120.0	2,525	119.3	Königswusterhausen (press)	15.0	1,600	187.5	Irkutsk	15.0
<b>DENMARK</b>											
281.2	1,067	Copenhagen	0.75	2,900	103.5	hausaen	15.0	1,910.8	157	Sverdlovsk	20.0
1,153	260	Kalundborg	7.5	<b>HOLLAND</b>							
<b>ESTONIA</b>											
296.1	1,013	Tallinn	11.0	208.2	1,006.1	Huizen	8.5	252.1	1,190	Barcelona (EAJ15)	1.0
465.3	644	Tartu	0.5	299.5	1,001.3	Radio Idzarda (The Haga)	3.0	288.7	1,116.2	Valencia	5.0
<b>FINLAND</b>											
201	1,031	Viipuri	13.2	1,056.3	284	Kootwijk	10.0	348.8	860	Barcelona (EAJ1)	8.0
368.1	815	Helsinki	13.2	1,071.4	280	Scheveningen-Haven	10.0	363.1	815	Seville (EAJ5)	1.5
559.7	536	Tampere	1.0	1,875	160	Hilversum	8.5	409.8	732	Madrid España	2.0
1,796	167	Lahti	45.0	<b>HUNGARY</b>							
<b>FRANCE</b>											
220.3	1,361	Béziers	0.5	550	545	Budapest	18.5	424	707	Madrid (EAJ7)	2.0
222	1,351	Fécamp	5.0	<b>ICELAND</b>							
245.9	1,220	Sunday after 11.0 p.m.	5.0	1,175	255.4	Reykjavik	16.0	454.0	600	San Sebastian (EAJ8)	0.8
237.6	1,261.2	Bordeaux-Sud-Ouest	2.0	<b>IRISH FREE STATE</b>							
249.4	1,203	Juan-les-Pins	0.5	224.4	1,337	Cork (6CK)	1.2	454.0	600	Madrid (EAJ7)	2.0
255.1	1,176	Toulouse (PTT)	1.0	413	745	Dublin (2RN)	1.2	230.6	1,301	Malinö	1.25
265.9	1,128	Lille (PTT)	1.3	<b>ITALY</b>							
272	1,103	Rennes	1.2	25.4	11,870	Rome (3RO)	15.0	257	1,167	Hörby	10.0
286	1,049	Montpellier	0.8	80	3,750	Trieste	10.0	306.8	977	Falun	0.5
287.6	1,043	Radio Lyons	30.0	247.7	1,211	Turin (Torino)	7.0	321.9	932	Goteborg	10.0
293	1,022	Limoges (PTT)	1.0	273.2	1,098	Turin (Torino)	7.0	435.4	689	Stockholm	55.0
304.9	984	Bordeaux (PTT)	13.0	312.2	961	Genoa (Genova)	10.0	541.5	554	Sundsvall	10.0
312.0	960	Natau-Vitus (Paris)	0.5	318.8	941	Naples	1.5	770	389	Ostersund	0.6
<b>NETHERLANDS</b>											
249.4	1,203	Juan-les-Pins	0.5	331.5	905	Milan	7.0	1,239.5	242	Boden	0.6
255.1	1,176	Toulouse (PTT)	1.0	368.1	815	Bolzano	1.5	1,348.3	222.5	Motala	40.0
265.9	1,128	Lille (PTT)	1.3	441	680	Rome (Roma)	50.0	<b>SWITZERLAND</b>			
272	1,103	Rennes	1.2	501.7	598	Florence (Firenze)	30.0	244.7	1,226	Basle	0.63
286	1,049	Montpellier	0.8	542.5	553	Palermo	3.7	246	1,220	Berne	0.5
287.6	1,043	Radio Lyons	30.0	<b>TURKEY</b>							
293	1,022	Limoges (PTT)	1.0	1,204.8	249	Istanbul	5.0	403	743	Sötenn	25.0
304.9	984	Bordeaux (PTT)	13.0	459	653	Bernmunster	60.0	1,538	195	Ankara	7.0
312.0	960	Natau-Vitus (Paris)	0.5	<b>YUGOSLAVIA</b>							
<b>PORTUGAL</b>											
290.5	1,033	Lisbon (CTIAA)	2.0	307	977	Zagreb (Agram)	0.75	430.4	697	Belgrade	2.5
<b>ROMANIA</b>											
304	761	Bucharest	12.0	574.7	522	Ljubljana	2.5	<b>SWEDEN</b>			
<b>RUSSIA</b>											
494.3	707	Moscow-Stalin	100.0	<b>NETHERLANDS</b>							
720	416.6	Moscow (PIT)	20.0	208.2	1,006.1	Huizen	8.5	<b>NETHERLANDS</b>			
937.5	320	Kharkov (Rv20)	25.0	299.5	1,001.3	Radio Idzarda (The Haga)	3.0	<b>NETHERLANDS</b>			
1,000	300	Leningrad	100.0	1,056.3	284	Kootwijk	10.0	<b>NETHERLANDS</b>			
1,034.5	290	Tiflis	10.0	1,071.4	280	Scheveningen-Haven	10.0	<b>NETHERLANDS</b>			
1,116	268.5	Moscow Popoff	75.0	1,875	160	Hilversum	8.5	<b>NETHERLANDS</b>			
1,170	255.4	Tascherit	25.0	<b>NETHERLANDS</b>							
1,304	230	Moscow (Unions)	165.0	<b>NETHERLANDS</b>							
1,481	202.5	Moscow	100.0	<b>NETHERLANDS</b>							
1,600	187.5	Irkutsk	15.0	<b>NETHERLANDS</b>							
1,910.8	157	Sverdlovsk	20.0	<b>NETHERLANDS</b>							
<b>NETHERLANDS</b>											
252.1	1,190	Barcelona (EAJ15)	1.0	<b>NETHERLANDS</b>							
288.7	1,116.2	Valencia	5.0	<b>NETHERLANDS</b>							
348.8	860	Barcelona (EAJ1)	8.0	<b>NETHERLANDS</b>							
363.1	815	Seville (EAJ5)	1.5	<b>NETHERLANDS</b>							
409.8	732	Madrid España	2.0	<b>NETHERLANDS</b>							
424	707	Madrid (EAJ7)	2.0	<b>NETHERLANDS</b>							
454.0	600	San Sebastian (EAJ8)	0.8	<b>NETHERLANDS</b>							
<b>NETHERLANDS</b>											
230.6	1,301	Malinö	1.25	<b>NETHERLANDS</b>							
257	1,167	Hörby	10.0	<b>NETHERLANDS</b>							
306.8	977	Falun	0.5	<b>NETHERLANDS</b>							
321.9	932	Goteborg	10.0	<b>NETHERLANDS</b>							
435.4	689	Stockholm	55.0	<b>NETHERLANDS</b>							
541.5	554	Sundsvall	10.0	<b>NETHERLANDS</b>							
770	389	Ostersund	0.6	<b>NETHERLANDS</b>							
1,239.5	242	Boden	0.6	<b>NETHERLANDS</b>							
1,348.3	222.5	Motala	40.0	<b>NETHERLANDS</b>							
<b>NETHERLANDS</b>											
244.7	1,226	Basle	0.63	<b>NETHERLANDS</b>							
246	1,220	Berne									

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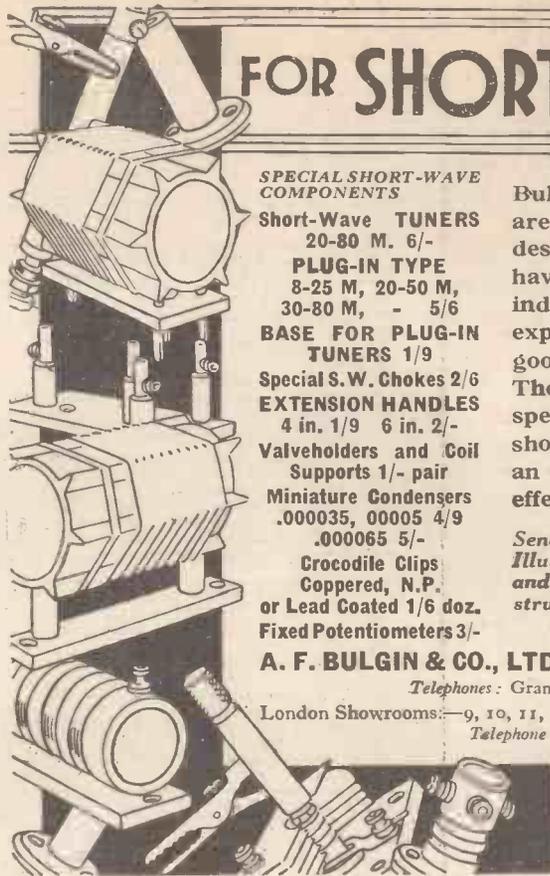


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CONSTRUCTORS.—Sets of parts for any circuit supplied by return. Best makes only. Send your list for all-in quotations. Lowest prices.—Handley, Radio, 49 Witham Road, S.E.20.

1932 ETHER SEARCHER—Authors' Kit. Lowest Prices Lists Free.—Melford Radio, Holmes Avenue, Brighton and Hove.

CONDENSERS.—Western Electric 1 mfd. 500 volt, working, slightly used. Guaranteed perfect. 1/- each. 10/- per dozen, post paid.—Southern Radio, 22 Francis Street, London, W.C.1.

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WIRELESS AS A CAREER. Those engaged in the radio industry and those desirous of obtaining employment in this profession should send for our booklet, "Wireless as a Profession," describing how, by spending a few hours weekly in home study, you may qualify for the better posts to be obtained.—Secretary, Northern Counties Wireless School, 55-57 Guildhall Street, Preston.

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The £3 3s. Four (SG, D, RC, Trans) . . . . . AW303 The £3 3s. Four (Improved Model) . . . . . AW303A Everybody's Radio-gramophone . . . . . AW310 Four Star 4 (SG, D, RC, Trans) . . . . . AW318 Five-Point Four (SG, D, RC, Trans) . . . . . WM216 Regional A.C. Four (SG, D, RC, Trans) . . . . . WM222 Brookman's Three-plus-one (SG, D, RC, Trans) WM233 Ether Rover (SG, D, RC, Trans) . . . . . WM266 Quadradyne (2 SG, D, Pen.) . . . . . WM273

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Britain's Super (Super-her) . . . . . AW311 A.C. Britain's Super (Super-her) . . . . . AW322 James Short-wave Super (Super-her) . . . . . AW328 Regional D.C. Five (SG, D, RC, Push-pull) . . . . . WM252

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Century Super (Super-her) . . . . . AW287 A.C. "Century Super" (Super-her) . . . . . AW295 Super 60 (Super-her) Mains Unit (1/-) . . . . . AW295A Super 60 (Super-her) . . . . . WM229 A.C. Super 60 Radio Gramophone (Super-her) . . . . . WM239 A.C. Super 60 (Table Model) . . . . . WM245 Super 60 (with Wearite base) . . . . . WM249 Super 60 (with Lewcos base) . . . . . WM251 1932 Super 60 (Super-her) . . . . . WM269 1932 A.C. Super 60 (A.C. Super-her) . . . . . WM274

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Copies of the "Wireless Magazine" and of "Amateur Wireless" containing descriptions of these sets can be obtained at 1s. 3d. and 3d. respectively, post free. Index letters "A.W." refer to "Amateur Wireless" sets and "W.M." to "Wireless Magazine."

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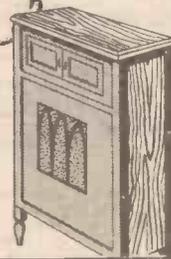
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The Transportable Three



The 1932 A.C. Super 60

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**The Quadradyne.**—A four-valver with two screen-grid valves and four tuned circuits—but only one tuning knob. Forty-five stations were received during a three-hour test. Gives great power and selectivity, but is very economical to run.

**The New Plug-in Coil Three.**—A set with detector and two transformer-coupled low-frequency stages that uses the ever popular two-pin type of plug-in coil. Can be built at low cost.

**OTHER INTERESTING FEATURES**

**Economy Push-pull.**—P. K. Turner, M.I.E.E., explains how to get quality at low cost by means of a special push-pull circuit.

**The Variable-mu Valve.**—A simple and easily understood discussion of its merits by F. E. Henderson, A.M.I.E.E.

**"W.M." Broadcast Map of Europe.**—This is accompanied by an alphabetical guide to the chief broadcasting stations showing their wavelengths.

**Low-frequency Filters.**—J. H. Reyner, B.Sc., A.M.I.E.E., explains what they are and what they do. An article of importance to the advanced constructor.

**The B.B.C. Resignations.**—A Special Commissioner asks whether too much importance is not attached to them and throws the light of common sense on recent changes at headquarters.

**What Can the Amateur Learn from the Manufacturer?**—An article by a keen constructor who has analysed many commercial sets and drawn certain important conclusions of interest to every home-constructor.

**Wonders of the Electric "Eye."**—Alan Hunter tells how light can be made to do work by means of light-sensitive cells. A great chance for new and interesting experimental work.

These are but a selection of the fifty-odd features included in the February issue of "Wireless Magazine," still the "best shillingsworth in radio." Make certain of getting your copy to-day. "Wireless Magazine" is on sale at every newsagent's and bookstall throughout Great Britain . . . . Price 1/-

# Wireless Magazine

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# The A.W. PRACTICAL SHORT-WAVE GUIDE



## A FOREWORD BY SIR JOHN REITH.

"The B.B.C. is glad to note how wireless journals are emphasising the importance of the future of short-wave broadcasting. The permanent Empire Short-wave Station at Daventry will, before the end of the year, provide services to all parts of the Empire.

"It is the ambition of the B.B.C. to make this development an important contribution to the solidarity of the Empire.

"Prospective experiments at Broadcasting House with ultra-short waves contain important possibilities, but it will not be known for at least a year to what extent these possibilities may be realised.

"International relays represent another sphere in which short waves should be of increasing value. As more exact knowledge is acquired of their characteristics and of the conditions of reception throughout the world, so there will be less uncertainty about results.

"Such examples are, I believe, more than sufficient to emphasise the growing importance of short-wave work in broadcasting."

*Sir John Reith, Director-General of the B.B.C., whose foreword, contributed at the Editor's special invitation, appears on the left*

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# Short-wave Stations You Can Log

The most up-to-date list of short-wave stations yet published, specially prepared for this supplement by the well-known foreign-station authority, J. GODCHAUX ABRAHAMS.

Telegraphy stations are marked with an asterisk, all others being telephony. Note that the times are given on the Continental 24-hour system, reduced to Greenwich Mean Time.

Wave-length	Call Sign	Station	Observations	Wave-length	Call Sign	Station	Observations
*14.13	WQA	New York (U.S.A.)	..	31.28	VK2ME	Sydney (N.S.W.)	.. 14.30-16.30 (Sun.)
14.17	LSN	Buenos Aires (A.R.)	.. Works with Madrid		VK3ME	Melbourne (Victoria)	.. 10.00-11.30 (Wed., Sat.)
14.28	OKI	Podebrady (Czech.)	..	31.30	W5XAU	Philadelphia (Pa.)	.. 21.00-06.00 (exc. Thurs., and Fri.)
14.47	LSY	Buenos Aires (A.R.)	.. Daily 15.00-19.00	31.35	WIXAZ	Springfield (Mass.)	.. Relays WBZ
14.55	PMB	Malabar (Java)	.. 10.40-15.40 (exc. Sun., Tues., Fri.)	31.35	SRI	Poznan (Poland)	.. 18.45-21.45 Tues., 18.45-01.00 Thur.
14.83	DGW	Nauen (Germany)	.. Teleph. with Buenos Aires	31.38	DJA	Zeesen (Germany)	.. Relays Pe lin, etc.
*14.95	DGX	Nauen (Germany)	..	31.48	W2XAF	Schenectady (N.Y.)	.. Relays W6Y
15.00	—	Jeloy (Norway)	.. Wkg. with U.S.A.	*31.5	WKI	New York (U.S.A.)	..
*15.03	LSG	Monte Grande (Buenos Aires)	.. With Paris and Nauen	31.51	OXY	Skamleback (Den.)	.. Relays Copenhagen
15.14	WMI	Deal Beach (N.J.)	.. Wkg. with England	31.55	VK3ME	Melbourne (Victoria)	.. 11.00 (Wed., Sat.)
15.198	EAQ	Aranjuez (Spain)	.. Wkg. with U.S.A.	31.75	—	Rio de Janeiro (Brazil)	.. 21.30-24.00 daily
15.20	—	Ruysslede (Belgium)	.. Wkg. with Congo	31.86	PLE	Bandoeng (Java)	.. 13.40-15.40 (Tues.)
15.33	FZS	Saigon (Indo-China)	.. Wks. with Ste Assise (France)	32.00	—	Dakar (Fr. W. Africa)	.. 19.15-21.00 (Tues., Thur., Sat.)
15.5	VK2ME	Sydney (N.S.W.)	.. Irregular	32.26	—	Rabat (Morocco)	.. 18.30 (Sun.)
15.5	—	Nancy (France)	.. Relays Radio Strasbourg (irr.)	33.00	—	L.L. Paris	.. 12.30-13.30, 18.00-20.30
15.51	WNC	Deal Beach (N.J.)	.. Works with Rugby	34.50	HKF	Bogota (Columbia)	..
*15.88	WKM	New York (U.S.A.)	..	34.68	W2XV	Long Island (N.J.)	.. 22.30 (Fri.)
15.93	PLE	Bandoeng (Java)	.. 10.40-15.40 (Tues., Fri.)	35.00	—	Dakar (Fr. W. Africa)	.. 18.15-19.15 (Tues., Thur., Sat.)
16.30	PCK	Kootwijk (Holland)	.. 15.00 daily	*35.70	NAA	Arlington (U.S.A.)	..
*16.40	ZSB	Cape Town (S.A.)	..	36.92	PLW	Bandoeng (Java)	.. 13.40-15.40
16.57	W9XAA	Chicago (Ill.)	.. Relays WCFL Chicago	*37.47	G.L.W.	Dorchester (Eng.)	..
*16.71	JNA	Tokio (Japan)	..	38.07	J1AA	Tokio (Japan)	.. 11.30-13.00
16.8	PLF	Malabar (Java)	.. Works with Kootwijk	39.4	X26A	Nuevo Laredo (Mex.)	.. 16.00-17.30 (Thur.)
16.85	PCV	Kootwijk (Holland)	.. 15.40 (Sat.)	39.7	HKF	Bogota (Columbia)	.. 01.00-03.00
16.9	HSJ	Bangkok (Siam)	.. 21.00 (Sun., Tues.)	39.8	—	Rio Bamba (Ecuador)	.. 02.00-04.00 (Fri.)
*17.2	LSB	Buenos Aires (A.R.)	..	40.0	DOA	Doerberitz (Germany)	.. 19.00-23.00
18.41	PCL	Kootwijk (Holland)	..	*40.6	UOK	Deutsch-Altensburg (Austria)	..
18.5	FZR	Saigon (Indo-China)	.. With Ste Assise (France)	41.00	HSP2	Bangkok (Siam)	.. 13.30-16.00 (exc. Mon.)
18.7	HSJ	Bangkok (Siam)	.. With Nauen (Germany)	41.6	EAR58	Teneriffe (Las Palmas)	.. 19.00-23.00
*19.25	TIR	Costa Rica	..	41.7	VSIAB	Singapore	.. 14.30-16.00 (Sun., Wed.)
19.56	W2XAD	Schenectady (N.Y.)	.. Relays WGY	42.3	D4XAA	Stuttgart (Germany)	.. 19.00-22.00
19.68	FYA	Pontoise (Paris)	.. 14.00-17.00 daily	*42.6	WSL	New York (U.S.A.)	..
19.72	W8XK	E. Pittsburg (Pa.)	.. Relays KWKA	42.8	F8BP	Rugles (France)	.. 13.30, 21.00-23.00
19.84	HVJ	Vatican (Rome)	.. 10.00-11.00 daily	42.9	CT1AA	Lisbon (Portugal)	.. 31.00-01.00 (Fri.)
20.5	XDA	Chapuetepc (Mex.)	.. 19.30-21.00 daily	43.00	EAR100	Madrid (Spain)	.. 22.00-24.00 (Tues. and Sat.)
21.5	YQI	Bucarest (Roumania)	.. 20.00 (Wed., Sat.)	43.60	D4AFF	Koethen (Germany)	..
23.8	—	Rabat (Morocco)	.. 11.30-13.00 (Sun.)	43.75	—	Vitus (Paris)	.. Relays Radio Vitus daily 18.45
24.0	CT3AQ	Funchal (Madeira)	.. 22.00-02.00 (Thur., Sat.)	44.9	DGK	Nauen (Germany)	.. Works with Dorchester (Eng.)
24.98	FZR	Saigon (Indo-China)	.. 14.00-16.00 daily	45.00	FM8KR	Constantine (Tunis)	.. 23.00 (Mon., Fri.)
25.16	RW50	Moscow (U.S.S.R.)	.. 18.00-21.00 daily	45.38	—	Moscow (U.S.S.R.)	.. 16.00-21.00
*25.18	SUW	Cairo (Egypt)	..	46.69	W3XL	Boundbrook (N.J.)	.. Relays WJZ
25.20	FYA	Pontoise (France)	.. 18.30-20.30 daily	46.72	RW62	Minsk (U.S.S.R.)	.. 18.00-22.00
25.25	W8XK	E. Pittsburg (Pa.)	.. Relays KWKA	48.00	CN8MC	Casablanca (Morecco)	.. 20.00-21.00 (Mon., Tues.)
25.27	VUC	Calcutta (India)	.. 03.45 and 16.15 (exc. Sun.)	48.35	HKC	Bogota (Columbia)	.. 15.00 daily
25.40	3RO	Prato Smeraldo (Rome)	.. Relays Rome. See also 80M	48.59	—	Halifax (Nova Scotia)	.. 32.00-03.00 (Tues, Thurs., Fri.)
25.465	—	Chi-Hoa (Saigon)	.. Tests 15.30-16.00 (Fri.)	48.62	HRB	Tegucigalpa (Mex.)	.. 00.30-04.00
25.5	XDA	Chapuetepc (Mex.)	.. 21.00 daily	48.80	VE9CL	Winnipeg (Can.)	.. 00.30 daily (exc. Sun.)
25.53	G5SW	Chelmsford (Eng.)	.. Weekdays only	48.86	W8XK	E. Pittsburg (Pa.)	.. Relays HWKA
25.6	—	Caracas (Venezuela)	.. From 21.00 daily	49.00	F31CD	Saigon (Fr. Indo-China)	.. 12.30 daily
25.63	FYA	Pontoise (Paris)	.. 21.00-23.00 daily	49.02	W2XE	Richmond Hill (N.Y.)	.. Relays WABC
*26.1	WSL	New York (U.S.A.)	..	49.18	W3XAL	Boundbrook (N.J.)	.. Relays WJZ
26.7	IBXX	S.S. "Elettra"	.. Irregular	49.4	ZTJ	Johannesburg (S.A.)	.. 15.30-20.30
27.3	2LW	Wellington (N.Z.)	.. Works with VK2ME Sydney	49.5	7LO	Nairobi (Kenya Colony)	.. 16.30 daily
*27.45	GLQ	Ongar (Eng.)	..	49.5	W3XAU	Philadelphia (Pa.)	.. Relays WCAU
28.20	PLR	Bandoeng (Java)	.. 11.00-15.00 daily	49.67	W2XAL	Coytesville (N.J.)	.. Relays WRNY
28.9	—	Nauen (Germany)	.. Works with Caracas	49.83	W9XF	Chicago (Ill.)	.. Relays WENR
28.98	LSX	Buenos Aires (A.R.)	.. 20.30-00.30 daily	50.00	RV59	Moscow (U.S.S.R.)	.. 18.00-21.00
29.3	T14NRH	Heredia (Costa Rica)	.. 23.00-03.00 daily	50.10	—	Eindhoven (Holland)	.. Relays Hilversum
29.5	HS2PJ	Bangkok (Siam)	.. 02.00-04.30 (Mon.)	50.26	HVJ	Vatican (Rome)	.. 15.30 daily
30.0	—	Belgrade (Jugo.)	.. 20.00-22.00 (Mon.)	58.00	OK1MPT	Prague (C.Z.)	.. 19.30 (Tues., Fri.)
30.57	LSOR	Buenos Aires (A.R.)	.. 22.00-01.00 daily	80.0	3RO	Prato Smeraldo (Rome)	.. Relays Rome
*30.70	EAM	Madrid (Spain)	..				
31.1	VUB	Bombay (India)	.. 11.45-13.00 (Mon., Wed., Sat.)				

# The B.B.C.'s Short-wave Tests

In this exclusive interview with our Special Commissioner the Chief Engineer of the B.B.C. tells of the proposed 7-metre tests soon to be started from the top of Broadcasting House.

THE B.B.C. is now taking a very great interest in short waves, and at the time of writing two short-wave transmitters are being built for Empire broadcasting from Daventry. Meanwhile the experimental short-wave transmitter at Chelmsford continues to provide an overseas programme on a wavelength of 25.53 metres.

## Experimental

A much more experimental undertaking is the construction of a special ultra-short-wave transmitter for tests on the extremely short wavelength of 7 metres. To get the true story of the B.B.C.'s 7-metre tests I recently interviewed the chief engineer of the B.B.C., Mr. Noel Ashbridge, and his remarks will certainly interest AMATEUR WIRELESS readers.

"We are instituting a lengthy series of tests on ultra-short waves," explained Mr. Ashbridge, "and by ultra-short waves I mean of the order of 7 metres."

"We are carrying out these tests in order to find out whether such short wavelengths can be used to supplement the present broadcasting service on the normal wavelengths.

"You might mention that we are working in conjunction with engineers of the Marconi Company. At the present moment they have nearly finished the construction of the transmitter.

"The power? Well, it will be about



Mr. Noel Ashbridge, Chief Engineer of the B.B.C.

one kilowatt in the aerial. But you must remember that the actual power varies very considerably according to the wavelength used. Since the whole object of the tests is to collect data the exact power is not of very great importance.

## In Broadcasting House

"As soon as the transmitter has been completed and tested," continued Mr. Ashbridge, "it will be installed in a room on the seventh floor of Broadcasting House. It will then be connected by feeder wires to the short-wave aerial, which will be erected on two of the

small lattice steel masts on the roof.

"Our object in choosing London for the 7-metre tests? Well, if these waves are successful they would probably be of more use in crowded towns and cities than in the open country.

"Then, again, London has more high steel-framed buildings than other cities, and tests under these conditions are, therefore, likely to produce the most valuable data.

"It should be emphasised that any broadcasting service that might be conducted on these short waves would be used to supplement the existing service and not to replace it in any way."

## Amateur Co-operation

I asked the Chief Engineer what part the amateur would be able to play in these short-wave tests.

"The design of sets for this ultra-short wavelength undoubtedly provides an interesting field of experiment for the wireless amateur.

"There are several problems in the reception of 7-metre signals that are waiting to be solved."

At present it is not possible, as the Chief Engineer explained, to say when the actual signals will be inaugurated on ultra-short waves, as there are several installation problems that will take some time to solve. Assuming that the tests finally yield successful results, the amateur will be in for an exciting time!

## SIMPLE FACTS YOU SHOULD KNOW ABOUT SHORT WAVES

OWING to the rapid developments constantly taking place on wavelengths below 100 metres, it is difficult to define the exact limits covered by the so-called short waves. For the average amateur short waves mean everything below 100 metres, but it is advisable to limit such a designation down to about 15 metres, as we shall, in the near future, be dealing with a rather special band of waves around 7 metres, and these will be known as ultra-short waves.

### 15 to 100 Metres

All the important short-wave stations to be heard on the sets and units described in this supplement come in the 15-to-100-metre band.

Just to show how useless it is to state exactly what are the wavelength limits of the short waves we might mention the recent experiments in short-distance telephony between Dover and Calais, when two-way communication was established on the extremely

short wave-length of 18 centimetres.

The most striking difference between short waves and the medium and long waves used for ordinary broadcasting is the tremendous carrying property of the short-waves on quite low power.

The secret of the great ranges covered by the short waves can be traced to the fact that short waves are reflected very effectively by the upper atmosphere, and it is the reflected ray that provides reception over many thousands of miles on low power. Of course the medium waves are also reflected, but it is now thought that the short waves are reflected by a much higher layer of ionised atmosphere than the medium waves.

Whatever may be the real explanation, it is a fact that when the wavelength is reduced to below 100 metres the range by reflected ray becomes literally world-wide. Not only can a low power of transmission be used, but at the receiving end quite a small set will serve to bring in good signals.

Signals of low wavelength have a very high frequency. So a small difference in wavelength on the short waves means a much greater frequency difference than for the same wavelength difference on the medium band.

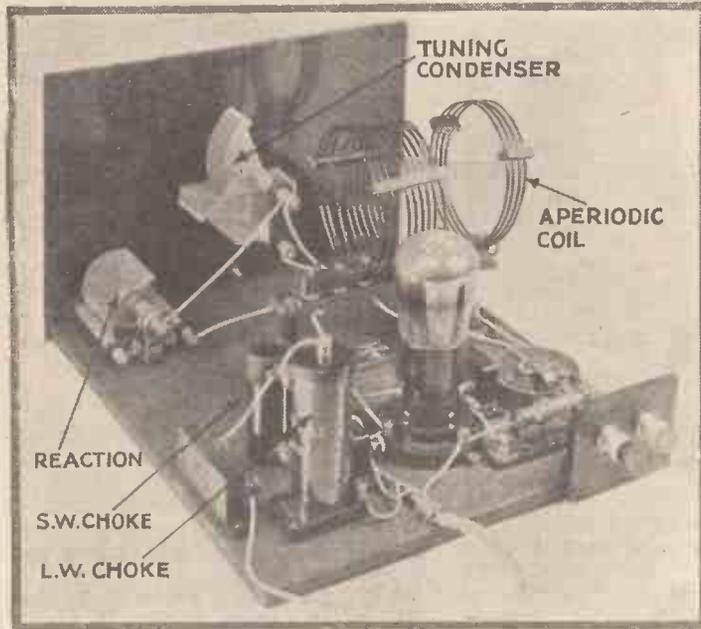
### Frequency Difference

An example will clearly show this point. We have Beromunster on 459 metres corresponding to a frequency of 653 kilocycles, and North Regional on a wavelength of 480 metres corresponding to a frequency of 625 kilocycles; in other words a wavelength difference here of 21 metres means a frequency difference of 28 kilocycles.

Now consider Buenos Aires on 28.98 metres corresponding to a frequency of 10,350 kilocycles and Bound Brook on 49.18 metres corresponding to a frequency of 6,100 kilocycles; here on the short waves a wavelength difference of about 21 metres means a frequency difference of 4,250 kilocycles! A. S. H.

# Short-wave Super-het Converter

Here we tell you how to make a one-valve unit that will convert any broadcast set embodying a stage of high-frequency amplification into a short-wave super-het. No alterations to the set are involved, and the unit connections are very simple



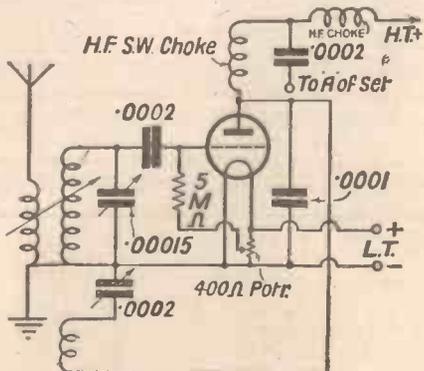
A view of the completed super-het converter. Note the mounting of the short-wave coil unit

BY far the most satisfactory way of getting down to the short waves is to use a super-het. It is not yet widely known that an ordinary broadcast set, provided it has one or more stages of high-frequency amplification, can easily be converted into a short-wave super-het.

All you need is an efficient one-valve unit, with short-wave tuning and reaction, and a suitable coupling between the unit and the set.

### The Circuit

The circuit diagram shows how such a unit is arranged to convert a set to



The circuit diagram of the short-wave super-het converter, showing the short- and long-wave high-frequency chokes in series in the anode circuit. Note the coupling condenser joining unit to set

short waves. As can be seen, the main circuit outline is a leaky-grid detector, with a .0002-microfarad grid condenser and a 5-megohm grid leak.

The grid circuit comprises a short-wave coil tuned by a .00015-microfarad variable condenser, a special short-wave type with widely spaced vanes. The aerial is coupled to this coil by means of a swinging aperiodic coil, which is untuned.

In this way

the heavy damping of the aerial system is not allowed to get to the grid tuning circuit, which, therefore, has a low enough resistance to allow ample reaction to be obtained over all the short wavelengths.

### Reaction System

The reaction system consists of a .0002-microfarad variable condenser in series with a short-wave coil coupled to the grid coil. To assist reaction a .0001-microfarad fixed condenser is connected between the anode of the detector and earth.

Another aid to reaction is the short-wave choke, which is connected between the anode and a long-wave choke. Although the short-wave choke diverts the high-frequency current through the reaction system, it allows the supersonic frequency, referred to in a moment, to pass through.

This new frequency is impeded by the long-wave choke, and passes through the coupling condenser connected to the junction of the chokes. It is therefore handed on to the set, which amplifies at high frequency and then detects and amplifies at low frequency.

Considering the action of the circuit as part of the set, we have first of all a short-wave incoming signal, tuned, or rather slightly mistuned, by the tuning circuit of the unit; as the unit detector is in a gently oscillating con-

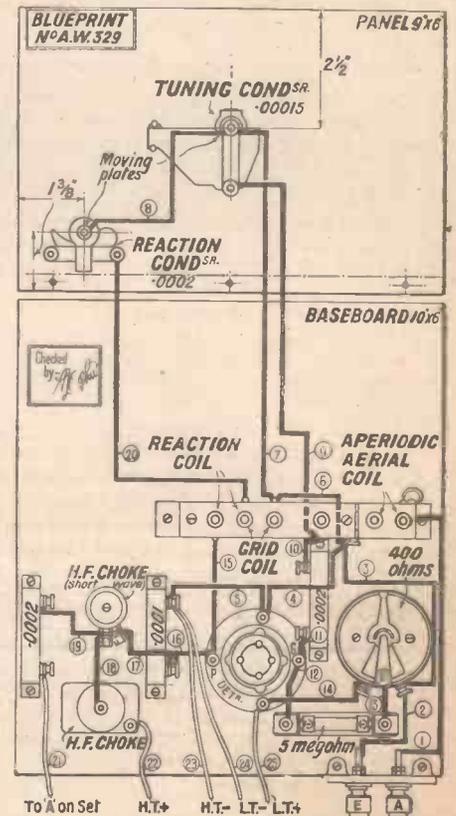
dition the local oscillation, of a slightly different frequency from the incoming signal, beats with the latter to produce in the anode circuit a new or supersonic frequency.

### Long-wave Tuning

This is handed on to the set's first valve, which must be a high-frequency amplifier. Another point is that the set must have its tuning adjusted to the long waves, between about 1,600 and 2,000 metres. The effect of the unit, when tuned to a short-wave signal, and with the detector valve oscillating, is to convert the incoming short-wave signal into a long-wave signal, which can be amplified by the set, provided the set is tuned to the long waves.

Although the short-wave unit appears to be tuning in the short-wave signals it is actually slightly mistuning them, in order to set up the beat frequency in the anode circuit. The amount of mistuning determines the frequency of the beat, and in practice it is only necessary to

(Continued on next page)



Reduced reproduction of the full-size blueprint available, post free, price 6d. This gives all the wiring details, as well as acting as a drilling template for the panel

# Short-wave Wrinkles

## Short-wave Aerials

THERE is no need for a special short-wave aerial with a short-wave set. Even a full 100-ft. aerial will work well if the aerial tuning circuit is properly designed. Failure to obtain oscillation on the shorter wavelengths may be due to aerial damping—the remedy is to loosen the aperiodic coupling or reduce the series aerial condenser—if there is one.

Sometimes a particular length of aerial will cause "blind spots" in the reaction, that is portions of the tuning range will not permit reaction to be obtained. A small loading coil will often cure this trouble; otherwise taking 10 ft. or so off the aerial will do the trick.

## What Capacity for Tuning?

For really critical short-wave tuning the variable condenser should not exceed .0003-microfarad maximum capacity, and often a maximum capacity of .0001 or .0002-microfarad is recom-

mended. Even with a slow-motion dial a standard .0005-microfarad tuning condenser is rather coarse in adjustment on the short waves.

If an ordinary broadcast set is being converted for short-wave tuning it is a good plan to arrange a fixed condenser in series with the existing variable condenser. A fixed capacity of .0005-microfarad will, in series with a .0005-microfarad tuning condenser, satisfactorily reduce the maximum for short waves.

## Add-on Short-wave Units

Most existing sets can be cheaply and easily made suitable for short-wave reception with the addition of a one-valve unit. There are two types; for detector-low-frequency sets the plug-in adaptor is recommended, but for sets with a stage of high-frequency amplification it is much better to use a super-het converter unit.

Both units cost about the same to

make, and this cost also applies to the assembly of a complete one-valve short-wave set, which can serve as a useful auxiliary for listeners who do not want to interfere in any way with the existing broadcast set. All three one-valve units are described in this supplement.

## Hand-capacity Effects

On short waves the effect of bringing your hand near the controls is sometimes most marked, either tuning or reaction or both being thrown out as the hand is removed. This should not happen if the moving plates of the tuning and reaction condensers are connected to earth.

A metal panel is a help in stabilising short-wave tuning, and better still is a totally-enclosed metal-cased set. If you are wearing headphones short-wave chokes in each of the 'phone leads may still further avoid tuning and reaction variations as you move in relation to the controls.

## SHORT-WAVE SUPER-HET CONVERTER (Continued from preceding page)

adjust the set's tuning on the long waves until the loudest signals are heard—there is nothing tricky in it.

To build up a converter for use with an existing set you will need the parts specified, and these can then be assembled as indicated by the photographs and reproduction of the blueprint.

The main points to note about the construction are that the panel takes the tuning condenser and reaction condenser, and that the rest of the components are mounted on the baseboard. There is no filament switch provided, since the unit will never be used on its own, but constructors can add such a switch if desired.

The aperiodic, grid and reaction short-wave coils are mounted on a coil base, as specified. The fixed coil unit com-

prises the grid and reaction windings, but the coupling between the aperiodic coil and the grid coil can be varied, because the aperiodic coil is separately plugged into a swivelling holder.

A terminal strip is provided for the connection of the aerial and earth, but the high- and low-tension battery connections are made with flexible wires direct to the components, as shown in the blueprint. The condenser between the chokes is also provided with a flexible lead, which goes to the aerial terminal of the set.

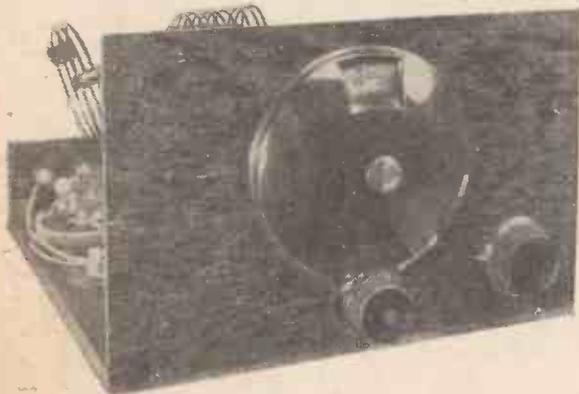
Note that a grid-leak potentiometer is fitted, so that reaction can be made very smooth by adjusting the slider to reduce the positive bias on the grid of the detector.

If the completed unit is to be used with an existing battery set there is no point in providing separate batteries. Connect the flexible leads from the converter to either the battery terminals of the set or to the batteries. Disconnect the aerial and connect it to the converter, taking the flexible lead from the converter to the vacant set terminal.

Then bring the converter valve into a state of oscillation and tune the set to the long waves. After this it should be easy to find many short-wavers, simply by turning the

tuning knob of the converter.

To get the correct action the detector of the converter *must* be oscillating, but owing to the super-het action this will not cause a squeal, but a rushing sort of noise. If actual oscillation on a signal is wanted, as when searching or when receiving morse, the reaction of the set should be used, but normally this should be left just short of its oscillation point, so that the high-frequency side of the set, which is amplifying the supersonic signals, is at maximum efficiency.



The simplicity of the controls in the super-het converter can be seen from this view of the completed panel, showing the slow-motion tuning dial and the reaction condenser knob. There is no filament switch knob.

Ebonite panel, 9 in. by 6 in. (Lissen, Permcot, Peto-Scott, Readi-Rad).

Baseboard, 10 in. by 9 in. (Camco, Peto-Scott, Readi-Rad).

Slow-motion dial (Lissen, Ormond, Utility).

.00015-mfd. short-wave variable condenser (Formo, Utility, Polar, J.B., Stratton).

.0002-mfd. reaction condenser (J.B., Bulgin, Lotus, Polar, Cydon).

Coils and base (Eddystone short-wave inductance unit).

Valve holder (Wearite, Lissen, W.B., Telsen, Igranic, Junit, Lotus, Benjamin, Bulgin, Clix).

Short-wave high-frequency choke (Igranic, Lissen, Readi-Rad, Wearite, Eddystone, Polar, Bulgin).

Long-wave high-frequency choke (Readi-Rad, Bulgin, R.L., Wearite, Telsen, Varley, Lissen, Lewcoo).

400-ohm potentiometer, baseboard mounting (Lissen, Readi-Rad, Igranic).

Grid-leak holder (Readi-Rad, Lissen, Telsen, Bulgin, Graham-Farish, Dubilier).

5-megohm grid leak (Lissen, Readi-Rad, Telsen, Dubilier, Graham-Farish).

Two .0002-mfd. and one .0001-mfd. fixed condensers (Lissen, T.C.C., Dubilier, Telsen, Formo, Sovereign, Graham-Farish, Ormond).

Terminal block (Junit, Sovereign).

Two terminals marked Aerial, Earth (Belling-Lee, Ealex, Bulgin, Burton).

Two wander plugs marked H.T.—, H.T.+ (Belling-Lee, Clix, Ealex).

Two spade terminals marked L.T.—, L.T.+ (Belling-Lee, Clix, Ealex).

Two yards thin flex (Lewcoflex).

Connecting wire and sleeving (Giffkins).

Valve (Mazda HL210).

**T**HIS is a special short-wavelength receiver tuning from 15 to 75 metres in two steps.

It is really a five-valve super-heterodyne set, having two intermediate-frequency stages and a screen-grid combined detector and oscillator. A single tuning condenser is used without loss of efficiency.

The circuit employed is an interesting one. We have in the aerial circuit, as shown in the diagram, a pre-set condenser, which is also joined to a point on the grid coil. This coil is tuned with a .00025 microfarad condenser, having a slow-motion device.

In the grid circuit of the valve, which is an ordinary screen grid, is a grid condenser and a leak resistance.

So far the circuit is ordinary. The interesting feature is the manner of connecting the anode circuit. From the anode we have first the pre-set reaction condenser and then the reaction coil, this reaction circuit going between the anode and the earth.

#### Function of the Choke

Connected to the anode is also a short-wavelength high-frequency choke and the primary winding of the first band filter of the 126-kilocycle amplifier. The high-frequency choke is used for the purpose of stopping the oscillations generated by the first valve from passing into the amplifier.

In the set, one end of the choke is joined by a wire about an inch long to the anode of the valve and the particular choke used works efficiently, as the set is perfectly stable.

The usual voltage is applied to the screen of the valve at H.T.+1, and the normal non-oscillating anode current is about 2 milliamperes. The valve oscillates because of the coupling of the reaction and grid coils and the strength is under a certain amount of control, as the reaction condenser is adjustable. This condenser, of the pre-set type, is screwed to the baseboard, and



# The James Short-wave

Details are given here for the construction and operation of a special five-valve

is set to give the best results with the particular valve and aerial used. Once set it is left.

Now the beat-frequency amplifier is designed to magnify signals having the mean or carrier frequency of 126 kilocycles. It, therefore, follows that the oscillator must generate oscillations having the frequency of 126 kilocycles greater or less than the frequency of the signal being received. Thus, if the signal has a carrier frequency of 15,000 kilocycles, the oscillations must have the frequency of 15,126 or 14,874 kilocycles.

The tuning condenser provided is used to tune the grid coil of the oscillator; as the aerial is also connected to this coil the aerial circuit is tuned, but so broadly that nothing is gained by using a separate condenser for the aerial circuit. It is necessary to adjust the pre-set condenser in the aerial wire to the coil rather carefully, in order best to adapt the aerial to the coil. When it has been set it is left and needs no further adjustment unless the aerial is changed. The setting of the pre-set condenser in the aerial circuit and also that in the reaction circuit affects the tuning

range a little and both should be set at the lowest possible values.

If a meter is included in the anode circuit of the first valve it will be seen that the current falls from a non-oscillating value of about 2 milliamperes to 1 milliamperes or less when oscillating. A short circuit across the tuning condenser will stop the oscillations.

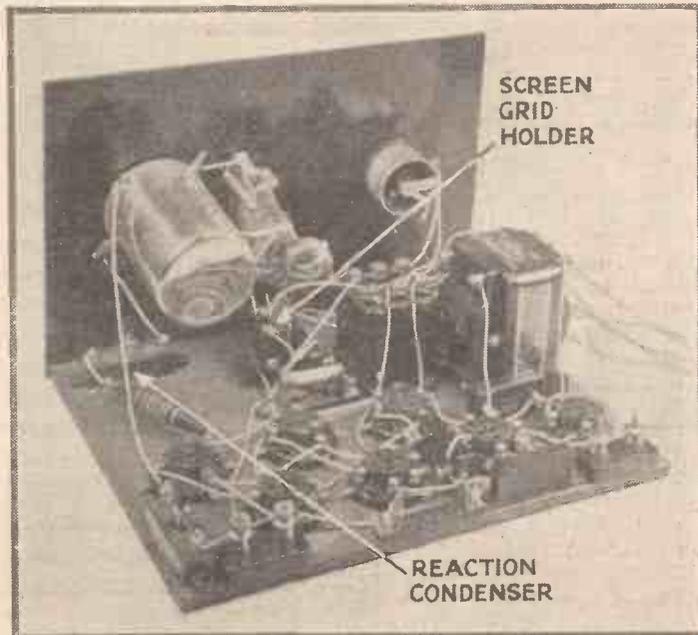
After the combined detector and oscillator are two stages of intermediate frequency amplification. The amount of the amplifica-

15 TO 75



Although a super-het, this set has only one tuning other controls, namely the volume control.

tion is adjustable, as a screen-grid potentiometer is fitted. This control has proved satisfactory in other super-heterodyne sets and is noiseless in working. The amount of the magnification provided by



In this view of the James Short-wave Super-het the position of the upright screen-grid valve holder near the oscillator coil should be noted.

#### COMPONENTS NEEDED FOR THE

- Ebonite panel, 12 in. by 8 in. (Lissen, Permcot, Peto-Scott, Read-Rad).
- Baseboard, 12 in. by 10 in. (Camco, Peto-Scott, Read-Rad).
- .00025-mfd. short-wave variable condenser, slow motion (J.B., Polar type "6")
- Super-het coils (Wearite, types 0.6, two OT2, one OT1).
- 50,000-ohm wire-wound potentiometer (Colvern, Sovereign, Watmel).
- Pre-set condenser, .0003-mfd. (Sovereign, Lissen, Formo, Lewcos, Telsen).
- Pre-set aerial condenser, .0001-mfd. (Formo, Telsen, Lewcos, Sovereign).
- Horizontal mounting valve holder (Lissen, W.B., Junit).
- Seven four-pin valve holders (Lissen, Telsen, W.B., Igranic, Bulgin, Wearite, Lotus, Benjamin, Clix).
- Three 1-mfd. fixed condensers (Dubilier Lissen, T.C.C., Telsen, Farrant, Formo).
- Two .001-, and two .0002-mfd. fixed condensers (Lissen, Dubilier, T.C.C., Telsen, Formo, Graham-Farish, Ormond, Sovereign).
- Two terminal blocks (Lissen).
- Two grid-leak holders (Read-Rad, Lissen, Dubilier Telsen, Graham-Farish Bulgin).

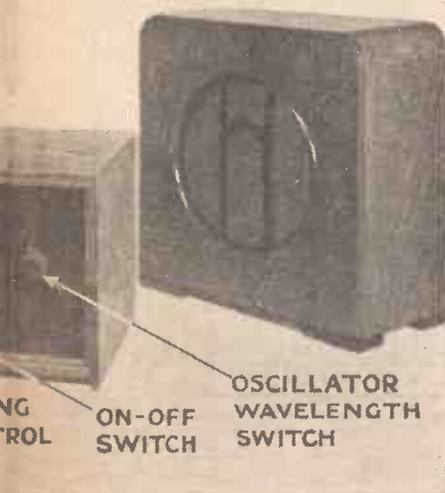
# JAMES



# Super-het

the super-het for short-wave reception. Designed and described by W. JAMES

METRES



control. This picture shows the simplicity of the rot, on-off switch and wavelength switch

the stages is considerable, being about the useful limit. If the maximum magnification were greater it could not be used.

Usual valves are employed as the second detector and this is followed by the power

### JAMES SHORT-WAVE SUPER-HET

- Two 1-meg. grid leaks (Lissen, Readi-Rad, Dubilier, Telsen, Graham-Farish).
- Short-wave high-frequency choke (Wearite Lissen, Eddystone, Readi-Rad, Bulgin).
- Three-point switch (Readi-Rad, Lissen, W.B., Wearite, Bulgin).
- One 15,000-ohm spaghetti resistance (Lissen, Lewcos, Graham-Farish, Sovereign).
- Low-frequency transformer (Lewcos, Lissen, R.I., Telsen, Igranic, Ferranti, Varley).
- Fuse holder and fuse (Readi-Rad, Bulgin, Telsen).
- Two spades, marked L.T.+, L.T.- (Belling-Lee, Clix, Ealex).
- Six wander plugs, marked G.B.+, G.B.-, H.T.+, H.T.+1, H.T.+2, H.T.+3 (Belling-Lee, Clix, Ealex).
- Connecting wire and sleeving (Jiffilinx).
- Six yards thin flex (Lewcoflex).
- Cabinet (Camco).
- Loud-speaker (W.B. PM3 cabinet model).
- 120-volt H.T. battery (Lissen, Pertrix, Drydex, Fuller, Ever-Ready).
- 9-volt G.B. battery (Lissen, Pertrix, Drydex, Fuller, Ever-Ready).
- L.T. accumulator (Lissen, C.A.V., Fuller, Exide).

valve. The two anode-circuit by-pass condensers help to stabilise the set and stop high-frequency currents from entering the power stage. There is a fuse in the negative H.T. lead and a three-point switch in the high and low tension circuits. Compactness has been obtained without loss of efficiency; in fact the short wiring made possible by arranging the parts close together is of assistance.

In the centre of the front panel is the tuning condenser and below it is the "on-off" switch. To the left is the volume control and to the right the special two-range coil unit. These parts can be fitted to the panel first. Be sure the slow-motion of the tuning condenser works nicely over the whole range. The dial and knob must not rub against the panel and the movement must be free. Examine the switch also. If there is a fault here, it is better discovered at this stage than when the set is wired.

Fix the two-range coil quite tightly in order that it shall not be worked loose after the switch has been used a few times.

Near the oscillator, but mounted upon the baseboard, is the valve holder for the first valve, that is the screen-grid detector oscillator. This valve lies in a horizontal position and so a special holder is used.

It is necessary very carefully to position the valve holders used to carry the three band-filters, as these coils must not touch. The other parts can be arranged in the places indicated in the blueprint and particular accuracy is not necessary.

Wiring is best carried out in two stages. First,

attach wires to all connections on the front panel that cannot be easily reached when this is in position. Then do the wiring of the parts on the baseboard such as that of the valve holders, transformer and fixed condensers. Afterwards fit the panel and wire the parts, and finally add the rubber covered flex for the battery circuits.

Do not mistake valve holders used for carrying coils for those used with the valves and mark them so that a mistake at a later date shall not be made.

### Valve Voltages

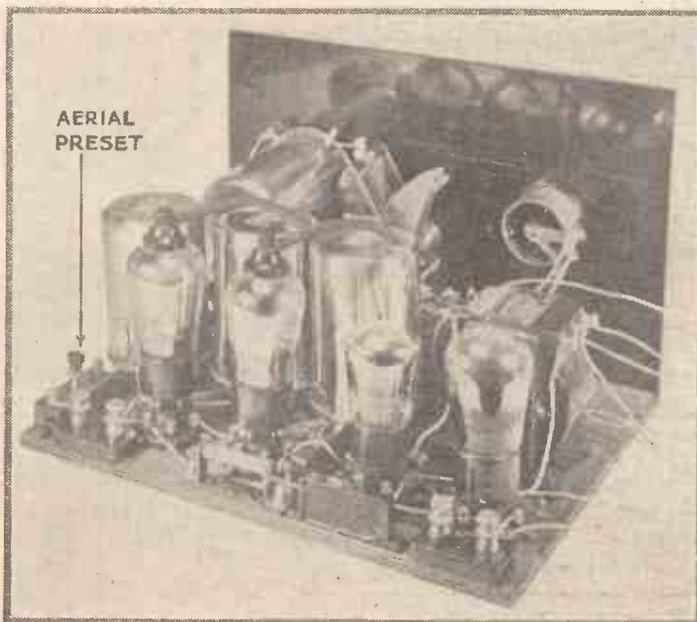
There are three screen-grid valves, a detector valve of medium impedance and a power valve which should be of as large a size as can economically be run from the high tension available. Apply grid bias to suit the power valve, take H.T.+1 to about 60 volts for the screen of the first

### VALVES FOR THIS SET

Make	S.G. (3)	2nd Det.	Power
Mullard ..	PM12	PM1HL	PM2A
Marconi } ..	S215	HL2	LP2/C
Osram ..			
Cossor ..	SG215	210HL	215P
Mazda ..	215SG	HL210	P220
Six-Sixty ..	215SG	210HL	220P
Lissen ..	SG215	HL210	P220
Tungsram ..	S210	H210	P215
Dario ..	SG	HF	SP
Fotos ..	BC150	BC18	BD9
Eta ..	By6	By2023	By1304

valve, H.T.+2 to 90 volts for the second detector and H.T.+3 to the full high tension which should, if possible, be not less than 120 volts.

The set is switched on by pulling "out"  
(Continued on next page)

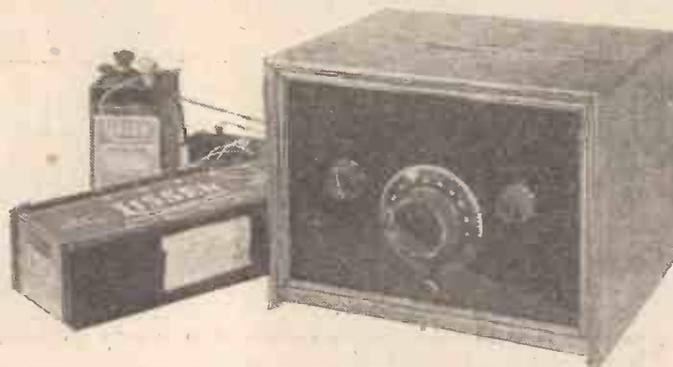


How the James super-het for short waves looks when the valves and coils have been inserted. The compactness of the layout is clearly shown

# The James Short-wave Super-het

the switch fitted to the front panel. Screw the knob of both pre-set condensers half in and rotate the tuning dial very slowly. When a station is heard, be it morse or telephony, the two pre-set condensers should be adjusted.

Try reducing the capacities by unscrewing the adjusting screws. The set will sound dead if the oscillator stops oscillating, so the pre-set condenser just below the coil, which is the one included in the reaction circuit, should be adjusted so that oscillations are obtained over both wave-ranges. But do not use more capacity than necessary and unscrew the knob as much as possible while maintaining oscillations over the whole range.



Ready for a preliminary test—the "James Short-wave Super-het" with Litsen high- and low-tension batteries connected up

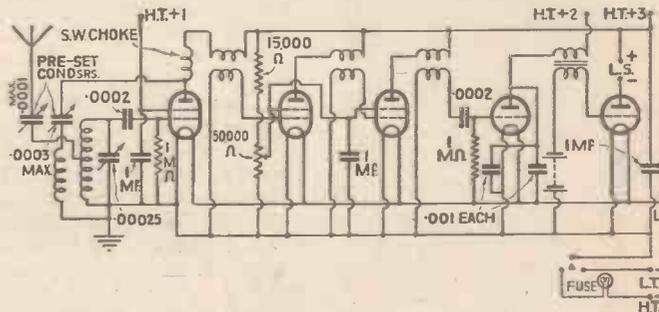
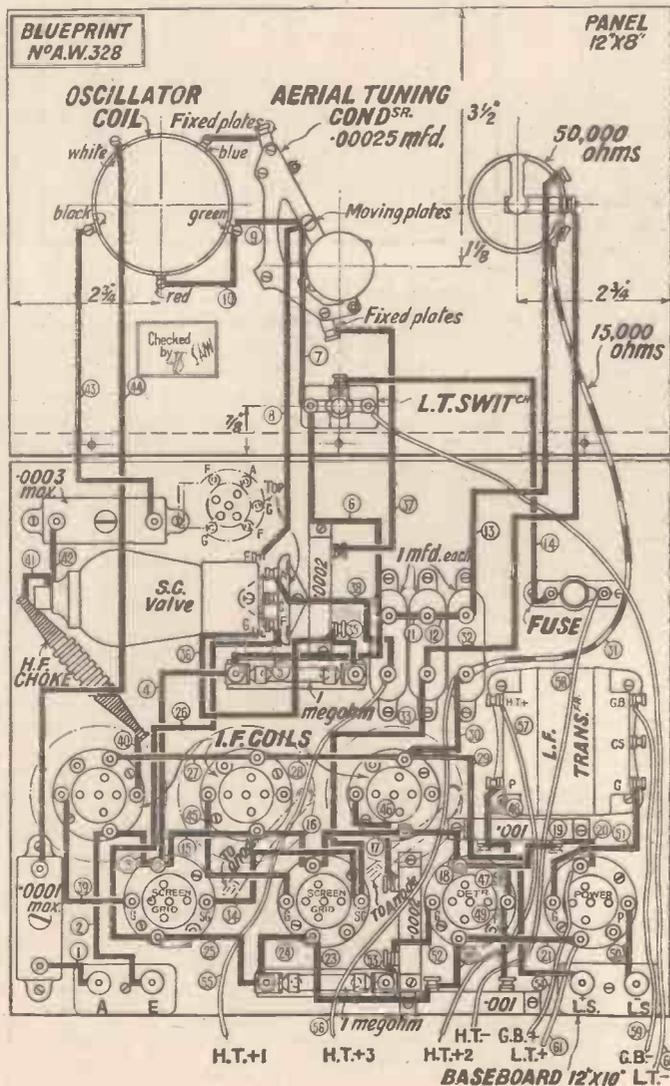
When the aerial pre-set condenser is being adjusted you will notice the signal strength varies and also the setting of the main tuning condenser. The condenser is simply adjusted in order

that the best results shall be obtained over the whole of the tuning range.

When a Lewcos oscillator unit is used the position of the first valve must be altered. The valve may be used upright as the other valves.

This coil unit has a push-pull wavelength switch and the curves show the approximate tuning which will, of course, vary with the condensers. The tuning is very easy as you would expect from the single control.

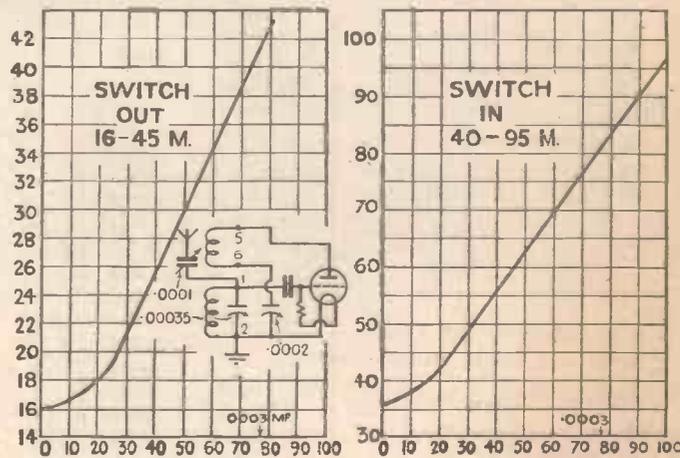
There is every reason to believe that the set will bring in all the short-wavelength stations available. Tests show that there is ample reserve of amplification and the results depend upon atmospheric and fading.



On the left is shown the reduced reproduction of the full-size blueprint of the "James Short-wave Super-het," price 1s. 6d. post free. All constructors should get this invaluable guide, which gives point-to-point wiring details, as well as all panel and baseboard layout instructions.

Above is shown the theoretical circuit diagram of the "James Short-wave Super-het," and this should be studied in conjunction with Mr. James' article.

Below are reproduced tuning graphs made by Mr. James with a view to helping readers who build up the Short-wave Super-het to locate the short wavelengths without a lot of preliminary searching. These charts refer to a slightly larger tuning condenser than is used in the set described, but the readings will nevertheless serve as a good guide.



# Notes for Short-wave Listeners

In this article, specially written for the supplement by a short-wave expert, you will find valuable information on present conditions below 100 metres

THE average broadcast listener labours under the misapprehension that the short waves are tricky, that it is difficult to tune a short-wave receiver and that short waves constitute a pitfall to beginners.

Further, there is the impression that to make any captures on wavelengths below 100 metres it is essential to possess an expensive and complicated receiver.

Believe me, there is no more difficulty, to-day, to listen to a broadcast from the United States or from even greater distances across the world than there is to pick up transmissions from one of the smaller Continental stations; if anything, I would prefer the former task at any time.

It is true that greater care must be exercised in tuning the receiver; it is useless to twiddle the dials in the hope of catching something. Even with a four- or five-valve broadcast set such a haphazard method ensures but poor results. With the advent of a super-het converter or with a plug-in adaptor attached to the wireless receiver, it is possible to log a number of transmissions emanating from almost all quarters of the globe.

## Always Something to Hear

Bear in mind that there is always something to listen to on short waves throughout all hours of the day and night; a glance at the table on page two of this supplement will demonstrate this fact. To secure confidence at the start, it is a good plan to try your hand at the more powerful stations, of which there is a wide range. Divide your list into three or four sections, according to the coils you have at your disposal.

If, for instance, you work on from 20 metres upwards, there should be little time lost in picking up the French Colonial station at Pontoise (France) on 25.20 metres; it is a 15-kilowatt which is at its best at about 6:30 p.m. G.M.T.

Almost immediately above from 5 p.m. onwards you should get W8XK relaying KDKA, East Pittsburgh, and again with a slight movement of the wrist, Prato Smeraldo on 25.40 metres taking the Rome programme.

You can prove whether you are dial-

ling correctly by the fact that in its immediate neighbourhood a National or Regional broadcast is captured through G5SW, Chelmsford. These are merely landmarks, which help you to calibrate your short-wave receiver.

If you can read morse, all the better, as deciphering the call-letters of an

within a minute or so, throughout the day from 1 p.m. G.M.T., you cannot fail to hear Zeesen (Berlin) on 31.38 metres and if you work up very slowly you will log Skamlebaek on 31.51 metres relaying Copenhagen from 7 p.m. onwards.

Now, having established the condenser reading of these two stations your next move is to search for PLE, Bandoeng (Java) on 31.86 metres for which the best time is 1.40 p.m. on Tuesdays.

Then again, between Zeesen and Copenhagen, W2XAF, relaying WGY, Schenectady (New York) on 31.48 metres may be discovered. Make your first attempt for this transmitter after the German station has closed down at 11.30 p.m.

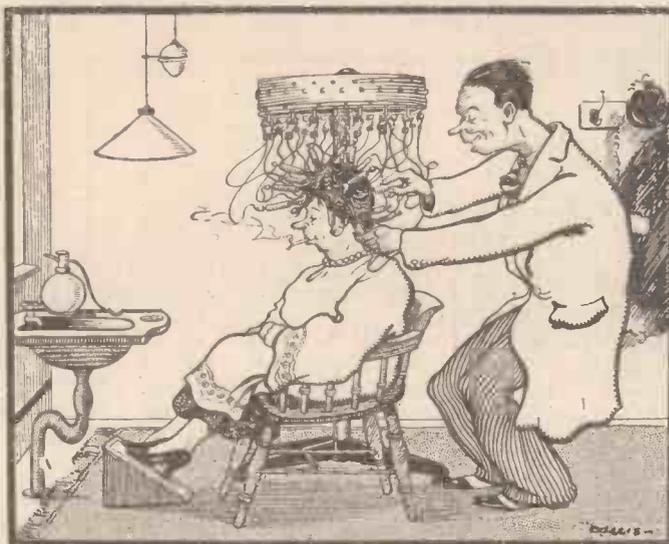
On a Tuesday or Thursday, also, on 31.35 metres Poznan is to be found transmitting from 6.45 p.m.; on the latter day it is on the air until 1 a.m., thus giving you many opportunities to add it to your log.

Finally, from 40 metres upwards, you are sure of a catch; it is perhaps the easiest portion of the waveband. You will log, in sequence, CT1AA, Lisbon (42.9 metres) on a Friday towards 10 p.m.; Madrid (EAR 100) on 43 metres from 11.30 p.m. on Tuesdays and Saturdays; Radio Vitus (Paris) nightly from about 6.45 p.m. on 43.75 metres; tests from Nauen (Germany) on 44.9 metres; Moscow on 45.38 metres, after 7 p.m.; Casablanca (Morocco) on 48 metres (Mondays, 8 p.m.); and the star station, W3XAL, relaying WJZ, Boundbrook and the National Broadcasting Company of America programme, on 49.18 metres now comes in at full strength from 7 p.m. onwards.

Following these, a slight twirl of the dial will take you to Moscow (50 metres) from which a 60-kilowatt blares out the usual Russian wireless "entertainments." Now, Nairobi (Kenya Colony) on 49.5 metres on some days, towards 6 p.m. is a "possible." and HVJ, Vatican-Rome on 50.26 metres at 7 p.m. can be relied upon nightly.

Around these stations, Eindhoven (50.1 metres) relaying the Hilversum programme can be received as soon as the Soviet transmitter has closed down (about 9 p.m.) and there are many others.

JAY COOTE.



Getting down to the short waves!

official station such as WKD, New York (22.33 metres) or WSL, New York (26.1 metres) will immediately show you over how many degrees a search is to be made.

Take another particularly fruitful portion of the band, namely, the section from 30 to 35 metres. Here,

## FOR THE SET BUYER

The following short-wave apparatus, comprising sets and adaptors, has been tested and approved by "Set Tester," whose weekly reports are a unique feature of "Amateur Wireless."

### SHORT-WAVE SETS

Eddystone "Kilodyne Four" kit; made by Stratton & Co., Ltd., price £6 17s. 6d.  
Eddystone "All wave Four," made by Stratton & Co., Ltd., price £25 for battery operation and £35 for A.C. mains.  
Gecophone short-wave super-het, made by General Electric Co., Ltd., price £27 10s.  
McMichael "Colonial" super-het, made by L. McMichael, Ltd., price £15.  
"Meteor Three" kit, for short and medium waves, made by Ready Radio, Ltd., price £3 15s.

### SHORT-WAVE ADAPTORS

Eddystone "Super-het Converter," made by Stratton & Co., Ltd., price £1 17s. 6d.  
Elex "Plug-in Adaptor," made by J. J. Eastick & Sons, price £2.  
Stonehouse "Short-wave Adaptor," made by Stonehouse Radio Supplies price 18s. 6d.

# Short-wave Plug-in Adaptor

Here is a simple one-valve unit designed by the "Amateur Wireless" Technical Staff for adapting simple detector-and-low-frequency sets for short-wave reception. The detector of the set is used in the adaptor, and the adaptor plug goes into the set's detector valve holder. No extra batteries are needed.



How the Short-wave Plug-in Adaptor looks when completed. Note the valve-holder plug on left, with its anode and filament connections to set

coil through a small variable condenser of the neutralising type. Unless this capacity is small the damping of the aerial on the coil will be too great and reaction will be impossible.

Across the tuning coil, which is part of an Eddy-stone short-wave unit, known as the Eddy-stone Duplex, is a .00015-microfarad variable condenser. With the three coils in the Duplex set, namely, the D2, D3, and D4, the tuning range is from about 15 to 100 metres, thus covering all the important short-wave transmissions.

### Reaction

In the Duplex coils is a separate reaction winding, which enables the reaction condenser, which has a maximum capacity of .00015 microfarad, to have its moving plates earthed.

point about the circuit—the plug. The anode and the two filament pins are wanted, and the grid pin is left unconnected. One side of the filament goes to one of the filament pins and the other side of the filament to the other pin.

(Continued at foot of next page)

ONE of the easiest ways of going down to the short waves is to convert or adapt the existing broadcast set so that its tuning covers the 15 to 100-metre waveband instead of the medium and long waves.

With this adaptor the tuning and reaction circuit associated with the broadcast set are cut right out of action, and in their place we have special short-wave tuning, with appropriate reaction.

### Exploring Short Waves

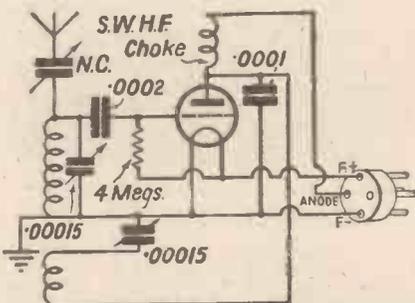
The Plug-in Adaptor, as we have called this little unit, can be made up in an hour or so, and will then provide many hours enjoyment by enabling the short waves to be explored.

Although most suitable for sets using simple detector and low-frequency amplifier circuits, this adaptor can, if desired, be used with any set, such as one with a stage of high-frequency amplification.

The principle of the adaptor is most easily understood by reference to the circuit diagram. It will be seen that the main outline of the adaptor is a leaky-grid detector, with values chosen for short-wave working.

The aerial is coupled to the short-wave

It will be seen from the circuit diagram that a .0002-microfarad fixed condenser and a 4-megohm grid leak



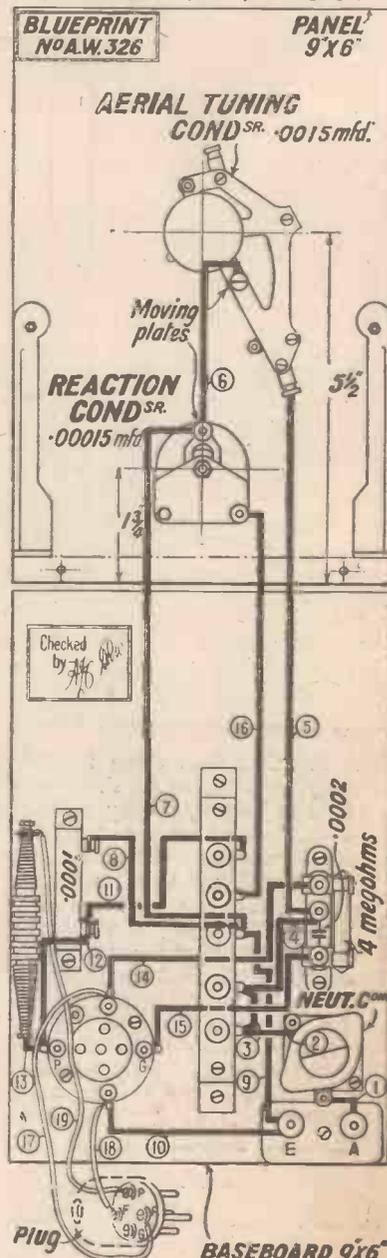
Circuit of the "Short-wave Plug-in Adaptor." The aerial is coupled to the tuning coil through a small variable condenser. The unit derives its battery supply from the set through the plug connector

are used for the detector. These values will ensure maximum sensitivity and smooth reaction.

Across the anode and earth is connected a .0001-microfarad fixed condenser. This improves the detection and avoids low-frequency instability.

Between the anode supply and the anode of the detector is a short-wave choke, which ensures smooth reaction over the entire short-wave band.

Now we come to the most important



This is a reduced reproduction of the full-size blueprint available, price 6d. post free. It gives all the wiring details, and is an invaluable aid to construction

# Tuning on the Short Waves

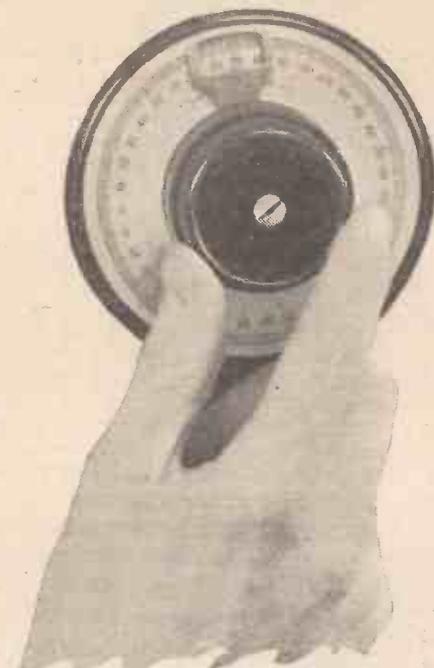
**I**N a nutshell tuning on the short waves means tuning very slowly. In most short-wave sets and units there is one knob for tuning and another knob for reaction. Both should be fitted with slow-motion dials, which should read from 0 to 180 degrees.

On the short waves reaction is really part of tuning; what we mean is that every time the reaction control is altered it affects the tuning. Therefore our second rule of short-wave tuning is this: never make only a reaction adjustment—make a reaction adjustment *and* immediately correct the tuning.

To revert to the first injunction—why must we tune a short-waver so slowly? Because the tuning knob varies a condenser; its capacity is altered. Even a small alteration in the capacity will cause some alteration in the wavelength of the tuning circuit. The point is that a small wavelength alteration on short waves means a big frequency variation.

Stations are separated by frequency and many short-wavers can crowd into a small wavelength band below 100 metres. Many can be entirely lost by making large capacity variations in the tuning condenser. So if you want to hear all the stations in range, and remember the range on short waves is world-wide, make small tuning adjustments by turning the tuning knob very slowly indeed.

It is no use making careful adjustments to the tuning if reaction is



**TURN THE TUNING KNOB SLOWLY**—That is the most important rule in operating a short-waver. Of course, a slow-motion dial should be used, and preferably marked from 0 to 180 degrees

mishandled. Consider the tuning and reaction knobs of a short-waver absolutely interdependent.

Reaction need not be critical in a good short-waver, but there is a critical amount of reaction for maximum

sensitivity. For the reception of telephony reaction must finally be set so that the detector valve is just short of the point of oscillation.

Before this final stage, though, the station must be found, and the easiest way to find a station is to bring the detector into a gentle state of oscillation.

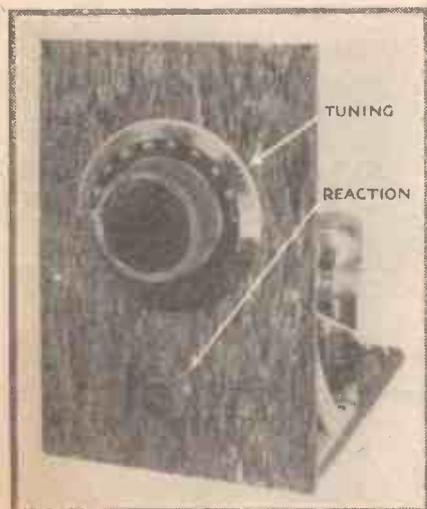
Do not exceed this gentle state in the hope that the carrier wave will be more readily located. Excessive oscillation on short waves tends to make the set "dead" and many a weak station will be lost under this condition.

You can easily prove this point by tuning in to some powerful C.W.-morse station, which will have a musical note when the detector is actually oscillating—only clicks will be heard when oscillation ceases. It will be found that, as the amount of oscillation is increased, as by increasing the setting of the reaction condenser, the strength of the C.W. signal will decrease.

When trying out a short-waver for the first time your tuning will be greatly simplified if headphones are used instead of the loud-speaker. It is much easier to appreciate the enormous amount of "traffic" on the short waves with headphones than on a loud-speaker.

Remember, always, when tuning a short-waver, that conditions in the ether are your master; if the ether seems "dead" no amount of skill will help you to tune in distant stations. Wait until there is a lively interlude—and then practise our advice.

## SHORT-WAVE PLUG-IN ADAPTOR (Continued from preceding page)



The controls of the Short-wave Plug-in Adaptor are simple; just tuning and reaction knobs. This is a view of the panel of the assembled adaptor. Operators of this set's controls should read the advice on tuning given above

It is advisable to mark the polarity of the filament connections on the plug, but even more important is a preliminary look at the set's filament wiring. You must arrange the plug connections so that when the plug is inserted in the detector valve holder the pin connected to the earthed filament contact of the adaptor goes to the negative side.

The only other point to note about the adaptor plug is that the short-wave choke goes to the anode pin, so that when the plug is in the detector valve holder this choke is in series with the low-frequency transformer, or whatever coupling normally follows the detector.

We hope we have made it clear that the adaptor derives its high- and low-tension through the plug from the existing set, and that the insertion of the plug automatically breaks the grid circuit of the set, and so brings in the short-wave tuning and reaction. The only part of the set actually used is the L.F. amplifier and the battery supply.

The operation of the Plug-in Adaptor is simple, once the preliminary adjust-

ments have been made. First, remove the existing detector valve and put it in the holder of the unit, plugging into the set's detector holder with the adaptor plug. Then remove the aerial and earth from the set and connect them to the terminals provided on the back of the unit.

Ebonite panel, 9 in. by 6 in. (Lissen, Peto-Scott, Readi-Rad).

Baseboard, 9 in. by 6 in. (Camco, Peto-Scott, Readi-Rad).

.00015-mfd. variable condenser, slow motion (J.B.).

.00015-mfd. reaction condenser (Bulgin, J.B., Lotus, Formo, Dubilier).

Panel brackets (Peto-Scott, Lissen, Camco).

Short-wave high-frequency choke (Wearite, Lissen, Igranic, Eddystone, Bulgin, Readi-Rad).

Valve holder (Lissen, W.B., Wearite, Telsen, Igranic, Junit, Lotus, Benjamin, Bulgin, Chix).

.0001-mfd. fixed condenser (Lissen, T.C.C., Dubilier Formo, Telsen, Graham-Farish, Ormond, Sovereign).

.0002-mfd. fixed condenser with grid-leak clips (T.C.C. type S.P., Dubilier, Lissen, Formo, Graham-Farish, Telsen, Ormond, Sovereign).

4-megohm grid leak (Lissen, Sovereign, Telsen, Graham-Farish, Dubilier).

Neutralising condenser (J.B., Peto-Scott).

Short-wave coils and holder (Eddystone "Duplex" short-wave coil unit).

Terminal mount (Lissen).

4-pin Bakelite plug (Bulgin, P9).

Two yards thin flex (Lewcoflex).

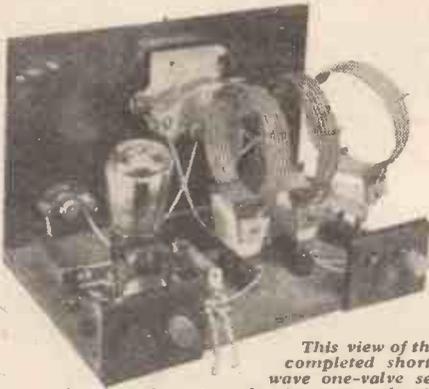
Connecting wire (Jiffilinx).

Valve, 210 Det. (Cossor).

# Short-wave One-valve Set

Constructional details of a simple one-valve set using plug-in coils, specially designed to give good headphone reception of all short-wave stations

AS an auxiliary to the ordinary broadcast set used by the family a one-valve short-waver, complete in itself, and used with headphones, has



This view of the completed short-wave one-valve set shows how the short wave plug-in coils are arranged on the baseboard

great attractions. It enables the family set to be left alone and yet offers, at very small cost, an opportunity to the experimenter to explore a fascinating wavelength range.

The short-wave one-valve set illustrated here will bring in most of the short-wave stations of the world at medium to loud headphone strength. Only a 60-volt high-tension battery is needed for the anode-current supply—the cost of running really is negligible.

From the circuit diagram it will be seen that three coils are used in the set. The first is the aperiodic aerial coil, which is variably coupled to the grid tuning coil by arranging its holder to swivel on one fixing screw. The short-wave tuning or grid coil is paralleled with a .0002-microfarad variable condenser.

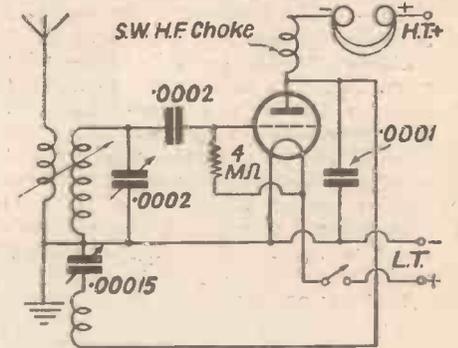
Also coupled to the grid coil is a reaction coil, in series with a .00015-microfarad variable condenser used to vary the amount of reaction. Note that the moving plates of the reaction condenser are connected to earth.

The detector is provided with grid-

as well as the filament on-off switch.

The baseboard is taken up with the rest of the components, special importance being given to the three single-coil holders to take the aperiodic, grid and reaction coils, which are of the short-wave plug-in type.

Keep the grid wires short and well



Circuit of the short-wave one-valver; note that an aperiodic aerial coil is coupled to the grid-tuning coil

away from the anode leads. Make the battery connections with flexible leads. Note that the aerial, earth, and headphones are connected to terminal blocks on the baseboard.

There is nothing else to note in the construction, except that the leads from the aerial and earth terminals to the aperiodic coil holder are made flexible, to allow for altering the coupling.

Having inserted a suitable detector valve—almost any H, HL, or L type



Controls of the short-wave one-valver comprise a slow-motion tuning dial, a reaction condenser on the left and a filament switch on the right. A view of the panel

being suitable, and connected up the 60-volt battery and 2-volt accumulator, and an aerial and earth, there is nothing to stop you getting many short-wavers.

The short-wave coils are made in all sizes from 2 turns upwards. For a start we suggest a 4-turn aperiodic coil, a 6-turn grid coil and a 4- or 6-turn reaction coil.

## COMPONENTS REQUIRED

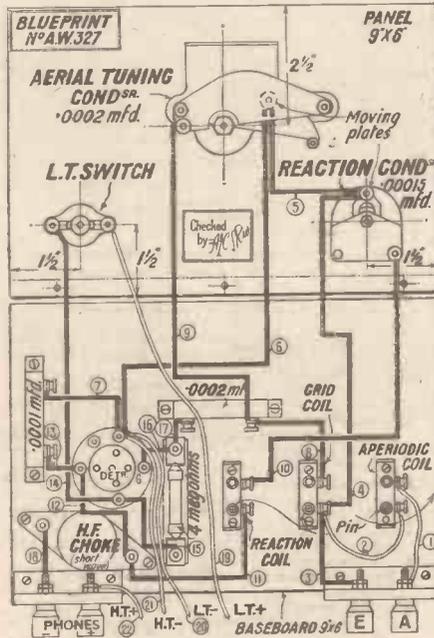
- Ebonite panel, 9 in. by 6 in. (Lissen, Peto-Scott, Readi-Rad, Becol).
- Baseboard, 9 in. by 6 in. (Camco, Peto-Scott, Readi-Rad).
- .0002-mfd. variable short-wave condenser (Utility, Forme, J.B., Eddystone, Polar).
- Slow-motion dial (Utility, Lissen, Polar, Forme, Ormond, Astra).
- .00015-mfd. reaction condenser (Bulgin, Lotus, J.B., Polar, Burton, Cyldon).
- Filament switch (Lissen, Readi-Rad, Telsen, Sovereign, Graham-Farish, Wearite, Bulgin, Junit, W.B., Lotus).
- 4-pin valve holder (Lissen, Telsen, W.B., Lotus, Junit, Benjamin, Bulgin, Wearite, Clix).
- Short-wave high-frequency choke (Lissen, Igranic, Wearite, Readi-Rad, Eddystone, Polar, Bulgin).
- One .0001-mfd. and one .0002-mfd. fixed condensers (Lissen, Dubilier, T.C.C., Telsen, Sovereign, Graham-Farish, Forme, Ormond).
- Three 2-pin baseboard coil holders (Bulgin, Lissen, Lotus, Wearite, Igranic, Eddystone).
- 4-megohm grid leak (Lissen, Duillier, Graham-Farish).
- Grid-leak holder (Readi-Rad, Lissen, Bulgin, Telsen, Graham-Farish, Dubilier).
- Two terminal mounts (Junit, Sovereign, Belling-Lec).
- Four terminals marked Aerial, Earth, Phones +, Phones - (Bulgin, Belling-Lec, Elex, Burton).
- Two wander plugs marked H.T.-, H.T.+ (Belling-Lec, Clix, Elex).
- Two spades marked L.T.-, L.T.+ (Belling-Lec, Clix, Elex).
- Three yards of thin flex (Lewcoflex).
- Connecting wire and sleeving (Hifilink).
- Valve (Mazda HL210).
- H.T. battery (Lissen, Pertrix, Drydex, Fuller, Ever-Ready).
- L.T. accumulator (Lissen, C.A.V., Fuller, Exide).
- Headphones (Electradix).

leak and condenser values most suitable for short-wave reception; thus the grid leak is 4 megohms and the grid condenser .0002 microfarad.

The anode circuit of the detector comprises a short-wave choke in series with the headphones and the high-tension supply. The choke serves to divert the high-frequency current through the reaction system. Note that a .0001-microfarad fixed condenser is connected between the anode and earth. This improves detection and the reaction.

The best way to build up this circuit into the set shown by the pictures is to follow the blueprint, which gives all the layout and wiring details.

On the panel are mounted the variable condensers for tuning and reaction



This is a reduced reproduction of the full-size blueprint of the short-wave one-valver. It can be obtained post free for 6d., and is invaluable as a guide to construction and wiring